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ABSTRACT

This book was created to place side by side the ideas of researchers and practitioners concerned with organizational innovation. Included are 18 papers: (1) "Social Environments That Kill Creativity" (Teresa Amabile); (2) "High Creativity versus Low Creativity: What Makes the Difference?" (Teresa Amabile and Sharon Sensabaugh); (3) "Creativity and Leadership: Causal Convergence and Divergence" (Dean Keith Simonton); (4) "Adaptors and Innovators: Problem-solvers in Organizations" (M. J. Kirton); (5) "Climate for Creativity: What to Measure? What to Say About It?" (Nancy Koester and Robert Burnside); (6) "Innovation through Investment in People: The Consideration of Creative Styles" (Robert Rosenfeld); (7) "Creating Healthy Change" (Perry Buffington); (8) "Facilitating Creative Problem-solving Groups" (Scott Isaksen); (9) "Establishing a Corporate Environment for Stimulating Innovation" (K. Larry Hastie); (10) "Making Organizations Adaptive to Change: Eliminating Bureaucracy at Shenandoah Life" (John Myers); (11) "Structuring for Innovation...And the Bottom Line" (Robert Swiggett); (12) "Leading a Revolution in American Health Care" (Erie Chapman); (13) "Fostering Creativity and Innovation in a New-Product Research Group" (Richard Wright); (14) "Creative Problem Solving" (David Morrison); (15) "Delivering Managed Service" (Ron Zemke); (16) "Growing Up Creative in America" (Elizabeth Larsen); (17) "Visioning: Building Pictures of the Future" (Robert Burnside); and (18) "The Era of Multiple Transformations: Megatrends for Adults" (Michael Marien). (NB)

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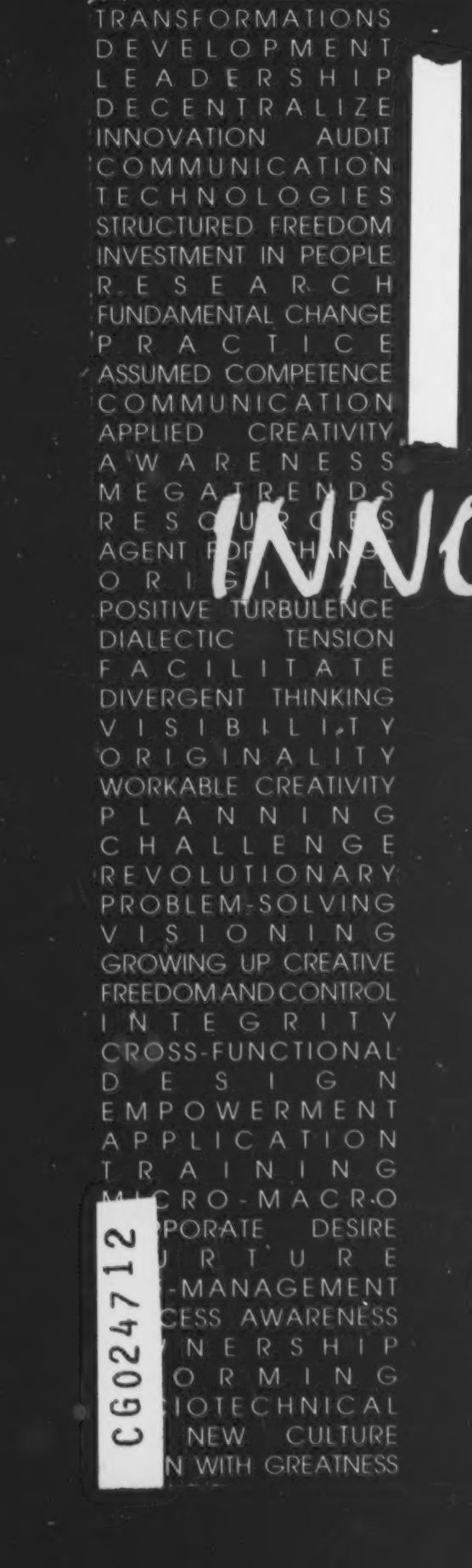

INNOVATION

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Preface

The purpose of this book is to place side by side the ideas of researchers and practitioners concerned with organizational innovation.

The papers included here are largely the products of an event called Creativity Week, which was held annually at the Center for Creative Leadership from 1978 through 1987. Each Creativity Week brought together a small group of theorists, researchers, and practitioners from industry, government, academia, and the arts for an exchange of ideas on applied creativity. This was a high-energy week, with almost nonstop action from Sunday through Friday. Highly participative presentations continued into the corridors and cafeteria, into the organizations of some participants, and—in some notable instances—into other symposia and associations (more on this last point below).

On Friday afternoon, while ideas were still hot and malleable, we would call the staff and presenters together to identify central ideas that promised to make a connection between the known past and possible futures, and between researchers and practitioners. We would then seize the moment and plan the next Creativity Week.

Looking back at the ten years of these conferences, we can now see a pattern of evolution. The earliest meetings focused on individual innovation; subsequent meetings centered on creativity and teamwork, and then on structuring the organization for innovation; the last meetings were primarily concerned with innovation and larger contexts—the cultural and technological environments and planning for the future.

We think that the articles presented here, chosen from the last five annually published proceedings of these conferences, will give a sense of all these themes. Some presenters have rewritten and updated their original reports. And we have added pieces which, although they were not given at a Creativity Week, grew out of the authors' participation at the conferences. We have also included a sample of the cartoons which were a part of the original presentations. One of the editors (DAH) doodled while the presenters talked. The other editor (SSG) and participants offered their comments, and from this joint effort, an "editorial cartoon summary" of each session was displayed for feedback at the end of the day. It provided a lighthearted way to wrap up some of the implications of and reactions to serious aspects of the sessions. Finally, we have added brief notes to the end of each article; we hope that these informal comments, by supplying some information on the authors and reactions to their ideas, will suggest how interactive and personal Creativity Week was.

What happened to Creativity Week? Well, in a sense, instead of being just a Center-sponsored event, it now belongs to the world. International symposia have taken its place. The Europeans are holding meetings (and have moved to make the format even more interactive by having every participant make a presentation), and the Latin Americans and Japanese are currently investigating the sponsorship of their own events.

Another legacy of Creativity Week is the emergence of networks devoted to the development of innovation. There are at least three which trace their roots to our meetings: the Association of Managers for Innovation (started in 1982), the Self-managing Team Study Group (started in 1989), and the Ideas Alliance Exchange (started in 1990). Other networks that derive in part from Creativity Week are Periscope (for the European Community) and Prism (for North America). Combined, these associations form an international network that is in touch with most of what's happening in the world today on creativity and innovation.

The oldest—AMI—has over 150 members from 90 companies in Europe and North America. The nucleus of the group was formed when Creativity Week participants from Goodyear, Kodak, and the Center met during a break and realized they had a joint interest in forming a network of practitioners of innovation. The impetus was the need to continue the dialogue taking place at the meeting beyond the week itself. Currently, the group meets twice a year at the Center and issues a newsletter; members confer throughout the year by telephone, fax, or computer links whenever they need to bounce a hot idea off someone committed to and experienced in innovative thinking.

This book, then, is part of an international movement in organizational creativity and innovation. The shifting conditions faced by organizations today demands that managers be leaders of change, and effective change requires innovation. We offer these articles with the hope that they will help foster innovation.

August 1992

PART ONE

Research

Social Environments That Kill Creativity

Teresa M. Amabile

Toward the end of the last century, a boy was born to a Jewish engineer and his wife in a small German town on the Danube River. Slow and shy, this boy did so poorly in school that, when his father asked the headmaster what profession his son should adopt, the answer was simply, "It doesn't matter. He'll never make a success of anything." He *did* make a success of something, though, but he almost seems to have done it in spite of his schooling.

As a youth, he attended a militaristic school in Munich that stressed discipline and memorization. Although he would never become famous for his views on education, his autobiography eloquently recalls the disdain he felt for such strictly controlled learning environments:

> It is nothing short of a miracle that the modern methods of instruction have not yet entirely strangled the holy curiosity of inquiry; for this delicate little plant, aside from stimulation, stands mainly in need of freedom; without this it goes to wreck and ruin without fail. It is a very grave mistake to think that the enjoyment of seeing and searching can be promoted by means of coercion and a sense of duty.

But coercion and a sense of duty were commonplace in those early school years. He later recalled the devastating effect that this external control had on his motivation. In particular, he hated having to cram for his science exams: "This coercion had such a deterring effect upon me that, after I had passed the final examination, I found the consideration of any scientific problems distasteful to me for an entire year."

The young man's name was Albert Einstein. If Einstein, who loved science even as a child, could be so adversely affected by a restrictive social environment, what impact does social constraint have on the creativity of less talented people?

For the last several years, I have tried to answer that question by studying the impact of various social and environmental factors on

the creativity of both outstanding and ordinary individuals (see Amabile, 1983). This approach can be viewed as a necessary counterpart to the personality research that most creativity researchers have been conducting. While they focus on the personality traits that distinguish highly creative people from everyone else, I focus on the social conditions that can positively or negatively influence anyone's creativity.

The Meaning of Creativity

Most definitions of creativity stress the importance of both novelty and appropriateness: A product or idea must be novel (different from what has come before), but it must also be appropriate to the problem (correct or useful or valuable in some sense). Obviously, the precise meaning of "appropriateness" changes from one work domain to another. If we are talking about mathematical creativity, an idea or an answer must be verifiably correct. If we are talking about artistic creativity, it makes more sense to think in terms of the appropriateness of the medium to the theme or in terms of aesthetic appeal. But whatever the domain, an idea cannot be merely novel to be considered creative; we have to distinguish between the creative and the purely bizarre.

I think it is important to include a third element in the definition of creativity: the nature of the task. Some tasks or problems are completely straightforward; the path to the solution is clear and can be performed almost by rote. These tasks are called *algorithmic.* For example, there is only one correct solution for an arithmetic problem such as this: 52 + 17 - 21. And there is only one way to bake a box cake according to the recipe—follow the steps outlined on the box. There is no room for creativity in the performance of these algorithmic tasks.

Other tasks are open-ended, such that the path to the solution is not completely clear and straightforward. These tasks are *heuristic;* some search is required. Heuristic statements of the above problems would be, "Find 3 numbers that can be added and subtracted to produce the sum 48" and, "Make a cake, choosing your own combination of ingredients." This open-endedness is what characterizes creativity tasks, such as the discovery of a new mathematical system or the invention of a new kind of cake recipe.

The definition of creativity that I have used includes all three of these elements: A product or response is creative if it is a novel and appropriate solution to the task, and if the task was presented heuristically.

Social Influences on Performance

Kenneth McGraw has suggested that algorithmic tasks and heuristic tasks are affected differently by social factors. In particular, he discusses the effects of expected reward. McGraw (1978) has shown that the expectation of reward can enhance performance on algorithmic tasks but can undermine performance on heuristic tasks. For example, people usually do better on simple multiplication problems if they are working for reward. They usually perform more poorly, however, if they are expecting a reward for solving problems that require insight.

Here is an example: Sam Glucksberg (1962) presented subjects with a deceptively simple problem. They were given a candle, a box of thumbtacks, and a book of matches and were told to use only these materials in mounting the candle on a vertical screen. The problem could only be solved by emptying the tacks out of the box and using it as a platform which could be tacked to the screen. Clearly, this problem is a heuristic one; the path to the solution is not at all obvious at the start. Subjects who were told that they could earn money for finding the solution quickly took much longer to solve the problem than subjects who worked without any mention of reward.

Social constraints are any factors that control, or could be seen as controlling, a person's performance. Things people normally view negatively, such as deadlines, surveillance and constrained choice, are considered social constraints. However, things that are viewed quite positively, such as working for a promised reward or expecting a favorable evaluation, may affect performance similarly. I believe that all social constraints can have the same effects as rewards, the same facilitative effects on algorithmic tasks and the same inhibitory effects on heuristic tasks.

Intrinsic and Extrinsic Motivation

These ideas on constraint and performance come out of social psychological theories of intrinsic motivation. Mark Lepper, Edward Deci, and others have proposed that social constraints (or *extrinsic* constraints) can undermine intrinsic motivation, the motivation to do something for its own sake. They suggest that if people start out with a great deal of intrinsic interest in their work, and then someone places them under an extrinsic constraint while they are working, their intrinsic interest will be undermined (see Deci, 1975).

Lepper and his colleagues (1973) demonstrated this effect in a simple study with children. They chose children who had initially

shown a high level of interest in playing with magic markers that had been placed in their nursery-school classroom. Individually, each of these children was asked to draw some pictures with the markers. The experimenter promised some of them an attractive reward if they consented to draw the pictures; he did not mention reward to the other children. Later, when they were back in their classroom, those children who had contracted for reward spent much less time playing with the magic markers than the other children did. It's as if, during the experiment, the rewarded children had asked themselves, "Why am I doing this?" Since the reward was so obvious an explanation, the reward became, to them, their reason for drawing the pictures. As a result, they no longer saw themselves as interested in the activity for its own sake. And, back in their classroom, with no reward possible, they actually showed little interest. This undermining of intrinsic interest with extrinsic constraint has been shown in a number of other studies with both children and adults.

The implications of these findings are rather startling. Parents, teachers, and business managers generally assume that a little reward is a good thing and that a lot of reward is more of a good thing. How can it hurt to present children and adults with incentives for their work? This evidence suggests that it can hurt. Although rewards (and other constraints) can certainly motivate our performance in the short run, in the long run they may destroy our interest in our work.

After reading Einstein's (1949) autobiography, I began to wonder if, perhaps, extrinsic constraints could have negative effects on performance in the short run, too. It seemed that, in addition to decreasing subsequent interest in a task, such constraints might make it more difficult for people to approach the task creatively.

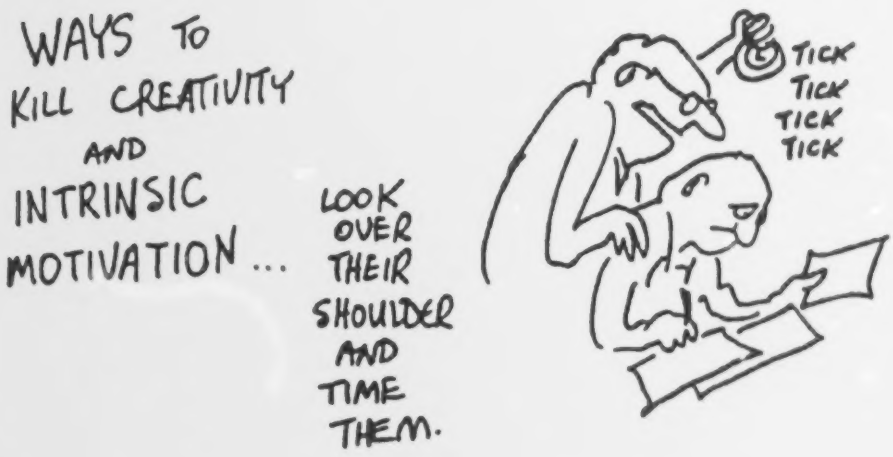
A heuristic task—a task requiring creativity—is like a maze that you must wander through. There may be more than one way of getting out, and some exits are more satisfactory than others. There are no clear markers showing you the path, so a great deal of searching is required. If you are intrinsically motivated, you are in the maze because you want to be there. You will enjoy nosing around, trying out different pathways, thinking things through before blindly plunging ahead. You're not really concentrating on anything else but how much you enjoy the challenge and the intrigue. And that approach will most likely lead you to creative solutions.

If you are extrinsically motivated, however, you see yourself as having been put in the maze by somebody else. You have to attain the external goal; you have to earn the reward, or win the competition, or get the promotion, or please those who are watching you. You are so singleminded about the goal that you don't take the time to think much about the maze itself. Since you're only interested in getting out

as quickly as possible (reaching the goal as easily as possible), you may rush into a lot of dead ends without much thought. Or you may take only the most obvious, well-traveled route. Either way, you are unlikely to be creative.

If the task is algorithmic, of course, extrinsic motivation is no problem. An algorithmic task is like a straight hallway, rather than a maze. There's no question about the right way to go—straight ahead. You can forge ahead quickly and blindly, and extrinsic motivators might just make you run faster.

This, then, is my intrinsic motivation hypothesis of creativity: Intrinsic motivation will be conducive to creativity, but extrinsic motivation will be detrimental. On noncreative (algorithmic) tasks, performance should not suffer under extrinsic motivation. But performance on creative (heuristic) tasks should be undermined.



A Model of Creativity

I do not mean to suggest that intrinsic motivation is all we need to be creative. Certainly, we cannot just leave children alone, in their natural state, and watch their creativity blossom. And we cannot expect to just leave adults to their own devices and watch them produce creative work on any task they undertake. In my theory of creativity, I outline three components that are necessary for creative work in any domain: domain-relevant skills, creativity-relevant skills, and task motivation.

Domain-relevant skills include knowledge about the domain in question (for example, knowledge about chemistry), technical skills required for work within the domain (such as laboratory skills), and special domain-relevant talent (such as a talent for visualizing molecules and their interaction). Domain-relevant skills depend on cognitive abilities, perceptual and motor skills, and formal and informal education. As another example, domain-relevant skills for musical creativity in our culture might include a familiarity with Western music forms and instruments, the ability to play an instrument and to transfer ideas into musical notation, and a special talent for hearing in imagination several instruments playing together. Domain-relevant skills can influence creativity on any task within the domain of endeavor—any research in chemistry, for example, or any musical composition.

Creativity-relevant skills include a cognitive style marked by an ability to break mental habits and an appreciation of complexity. Also included is a work style characterized by an ability to concentrate effort for long periods of time, a sense about when to leave a stubborn problem for a while, a generally high energy level, and an implicit or explicit knowledge of creativity heuristics. The last simply involves rules of thumb for generating ideas—for example, "Try something counter-intuitive." Creativity-relevant skills can be influenced by training, by experience in generating ideas, and by personality characteristics. Creativity-relevant skills operate at the most general level; they can influence performance in any domain.

Task motivation can be very specific to particular tasks within domains, and may even vary over time for a particular task. As I have suggested, an intrinsic task motivation (doing the task for its own sake) should be more conducive to creativity than an extrinsic task motivation (doing the task as a means to some extrinsic goal). Overall task motivation will depend on both the individual's initial attitude toward the task (we all have our somewhat idiosyncratic preferences for activities) and the presence or absence of salient constraints in the social environment. If such constraints are present, motivation should become extrinsic. There is a third factor that can influence overall task motivation: the individual's own ability to diminish the importance of extrinsic constraints. This last point can be an important one, and I will return to it later.

Each of the three components must be present for creativity to emerge. The higher the level of the three components, the higher the overall creativity. Clearly, then, much more is required than an intrinsic task motivation. But, in trying to maximize a person's creativity in the workplace or the classroom, it might be best to focus on the task

motivation component. Unlike creativity-relevant skills and domain-relevant skills, task motivation can be influenced quickly, easily, and inexpensively by relatively small changes in the social environment. At the same time, though, these changes can be very powerful. According to my theory, task motivation makes the difference between what a person *can* do (based on domain-relevant and creativity-relevant skills) and what that person *will* do.

Research on the Motivation Question

Is intrinsic task motivation, in fact, more conducive to creativity than extrinsic motivation? Will people working under salient extrinsic constraints produce work that is less creative than the work done by people not under constraint? What is the research evidence?

The method we have used to answer these questions is quite straightforward. The basic procedure is borrowed from previous social-psychological research on motivation: All subjects work on some activity that is, initially, intrinsically interesting. The situation is set up so that some of them feel there are no constraints on their task engagement. Other subjects, though, are placed under some external constraint that is made as salient as possible.

In these studies, the activity is always some simple heuristic task—making a paper collage or writing a Haiku poem, for example. After the experimental sessions have been completed, all of the products made by subjects are shown to experts in the field. (An expert, for our purposes, is someone with at least three years of experience working intensively in the field.) These judges are asked to rate each product on creativity, using their own subjective definition of creativity. Working independently, the judges generally show a good level of agreement in their creativity ratings. Moreover, the ratings of creativity are generally separable from judges' ratings of other product dimensions (such as technical quality or aesthetic appeal). After the creativity ratings have been obtained, they are analyzed to determine whether extrinsic-constraint subjects did, indeed, produce less creative work.

Of all the external constraints under which well-known creative people have labored, perhaps none has been so widely despised as the outside *evaluation* of one's work. Einstein loathed the necessity to digest course material for the sole purpose of spewing it back on an examination. And the poet Sylvia Plath, struggling with a monstrous writer's block, said, "I want . . . to feel my work is good and well-taken. Which ironically freezes me at my work, corrupts my nunnish labor of

work-for-itself-as-its-own-reward," and "Yes, I want the world's praise, money, and love, and am furious with anyone . . . getting ahead of me" (Hughes & McCullough, 1982).

Shereen Brackfield and I examined the effects of evaluation expectation on creativity, as well as the effects of a closely related variable: surveillance of work (see Amabile, Goldfarb, & Brackfield, 1990). The design of this study was a simple one, where half of the women subjects believed that their artworks (paper collages) would be evaluated by experts, and the other half did not. Within each of these conditions, half of the women believed they were being watched through a one-way mirror while working. We found that both evaluation and surveillance had a negative impact on creativity, although the effect of evaluation was considerably stronger. Overall, the least creative subjects were those who believed they were being watched and who expected evaluation of their collages. The most creative subjects were those concerned with neither evaluation nor surveillance. This negative effect of evaluation expectation has shown up consistently in a series of studies using different creativity measures.

Competition with peers is another common theme in the introspective writings of outstandingly creative people. When James Watson and Francis Crick were locked in their struggle to beat Linus Pauling at discovering the DNA structure, they learned from Pauling's son that he appeared to have the answer:

> In addition to routine family gossip [in a letter from Pauling] was the long-feared news that Linus now had a structure for DNA. No details were given of what he was up to, and so each time the letter passed between Francis and me the greater was our frustration. Francis then began pacing up and down the room thinking aloud, hoping that in a great intellectual fervor he could reconstruct what Linus might have done. As long as Linus had not told us the answer, we should get equal credit if we announced it at the same time. (Watson, 1969, p. 99)

And Sylvia Plath wrote in her journal,

> All I need now is to hear that G. S. [George Starbuck] or M. K. [Maxine Kumin] has won the Yale [prize] and get a rejection of my children's book. A. S. [Anne Sexton] has her book accepted at Houghton Mifflin and this afternoon will be drinking champagne. Also an essay accepted by *PJHH*, the copycat. But who's to criticize a more successful copycat. Not to mention a poetry reading at McLean. . . . And now my essay, on Withens, will come

> back from *PJHH,* and my green-eyed fury prevents me from working. (Hughes & McCullough, 1982)

In a study with two groups of children, I found some evidence that competition can directly undermine creativity (Amabile, 1982). Children who believed they were competing for prizes in making their collages produced somewhat lower levels of creativity than children who weren't competing. Interestingly, the groups were most different in the variability of their use of the materials. In the noncompetition group, the children seemed to experiment a great deal with the materials, sometimes using just a few colors, sometimes using nearly every color available. In the competition group, however, the children took a much more conservative approach. There, most of the children used some moderate number of colors and some moderate number of pieces in making the collage.

Dostoevsky (1948) wrote about a terribly frustrating experience he went through in trying to write a commissioned novel. In particular, he felt constrained by the commitment he made through the contracted *reward:*

> And as for me, this is my story: *I worked and I was tortured.* You know what it means to compose? No, thank God, you do not! I believe you have never written to order, by the yard, and have never experienced that hellish torture. Having received in advance from the *Russy Viestnik* so much money. . . . I fully hoped in the beginning of the year that poesy (literary creativity) would not desert me, that the poetical idea would flash out and develop artistically towards the end of the year, and that I should succeed in satisfying everyone . . . but on the 4th of December . . . I threw it all to the devil. I assure you that the novel might have been tolerable; but I got incredibly sick of it just because it was tolerable, and not *positively good*—I did not want that.

McGraw and his colleague John McCullers (1979) demonstrated that the promise of reward can interfere with creative behavior. They gave subjects Luchins' classic water-jar problems. Each problem presents the subject with drawings of three jars in different sizes. The task is to write an equation for using those jars to measure out some exact quantity of water. The first several problems are all solvable only by following the same algorithm, the same algebraic formula. The last problem requires subjects to "break set," to find a new solution, since the familiar algorithm will no longer work. McGraw and McCullers found that subjects working for reward took longer to solve

the last problem and made more errors than subjects not promised a reward.

Judy Gitomer and I found that a *restriction of choice* in how to do a task can also undermine creativity (Amabile & Gitomer, 1984). Nursery-school children who were given a choice of collage materials produced more creative collages than children who were given the same materials but with the choice having been made by the experimenter.

These, then, are the methods that we know about for killing creativity: expected evaluation, surveillance during work, competition, expected reward, and restriction of choice. Each of these social variables appears to undermine creativity. According to the theory, this undermining occurs through a decrease in intrinsic motivation. But these studies do not directly prove that point.

A Direct Test with Creative Writers

We need direct evidence that intrinsic motivation is more conducive to creativity than extrinsic motivation. To this end, I did a study designed to directly create an extrinsic motivational state in some subjects, without going through the intermediate step of imposing an extrinsic constraint (Amabile, 1985). And the same method was used to directly create an intrinsically motivated state in other subjects. For this purpose I borrowed a technique from Gerald Salancik (1975). Subjects are asked to complete a questionnaire about their attitudes toward something (in this case, attitudes toward the creativity task). Some are given an "intrinsic questionnaire"; all of the items deal with the intrinsically interesting aspects of the activity. Other subjects complete an "extrinsic questionnaire," which deals with only extrinsic reasons for doing the activity. The purpose of the questionnaires is simply to lead subjects to think about the activity in intrinsic terms or extrinsic terms. Then the immediate effects of this intrinsic or extrinsic orientation can be directly observed.

It was important in this study to find subjects who were already involved in some creative activity on a regular basis so that we might temporarily influence their orientation toward that activity. To this end, we recruited creative writers, using advertisements such as this: "Writers: If you are involved in writing, especially poetry, fiction, or drama, you can make three dollars for about an hour of your time. We are studying people's reasons for writing." Most of those who responded to the ad were undergraduate or graduate students in English or creative writing at Brandeis University or Boston University, although a few were not affiliated with any university. The most

important characteristic of these participants, for our purposes, is that they identified themselves as *writers*—they came to us with a high level of involvement in writing.

We had some additional criteria for choosing participants from those answering our ad; subjects had to answer "yes" to one or more of the following:

1. Completion of one or more advanced creative writing courses.
2. Publication of one or more works of poetry.
3. Publication of one or more works of fiction or drama.
4. Spending an average of four or more hours of their own time per week in writing poetry or fiction.

The average response to the last question was 6.3 hours, with a range of 3 to 18. Obviously, this group did consist of people who were committed to creative writing.

The basic idea of this study was to have each writer come to the laboratory individually and, once there, to complete a questionnaire on "Reasons for Writing"—reasons for being involved in writing. (Some subjects, in a control condition, did not complete any questionnaire.) The questionnaire would either present only intrinsic reasons for writing or only extrinsic reasons, leading the writer to concentrate on either intrinsic or extrinsic motives for writing. Then all of the writers would be asked to write a brief poem, which could later be judged by our expert-assessment technique. In this way, we could look at the effects of temporary motivational orientation on creativity.

We wanted to present our subjects with items about writing that were as purely intrinsic or as purely extrinsic as possible. To get such items, we generated an initial list of 30 reasons for writing and asked a group of undergraduates at Brandeis to identify each reason as intrinsic, extrinsic, or neither/both, according to these definitions:

> An *intrinsic* reason is one that focuses on the person's interest in and enjoyment of writing for its own sake, for the pleasure of the actual writing. An *extrinsic* reason is one that focuses on the external things a person can get by writing, the tangible and intangible rewards from other people. An *intrinsically* motivated person is self-motivated and would write even in the absence of external goals or pressures. An *extrinsically* motivated person is motivated by other sources, by external goals and pressures.

Seven of the reasons were consistently identified as intrinsic:

1. You get a lot of pleasure out of reading something good that you have written.
2. You enjoy the opportunity for self-expression.
3. You achieve new insights through your writing.
4. You derive satisfaction from expressing yourself clearly and eloquently.
5. You feel relaxed when writing.
6. You like to play with words.
7. You enjoy becoming involved with ideas, characters, events, and images in your writing.

Seven other reasons were consistently rated as extrinsic:

1. You realize that, with the introduction of dozens of magazines every year, the market for freelance writing is constantly expanding.
2. You want your writing teachers to be favorably impressed with your writing talent.
3. You have heard of cases where one best-selling novel or collection of poems has made the author financially secure.
4. You enjoy public recognition of your work.
5. You know that many of the best jobs available require good writing skills.
6. You know that writing ability is one of the major criteria for acceptance into graduate school.
7. Your teachers and parents have encouraged you to go into writing.

The introductory paragraphs on the two questionnaires were identical. This introduction informed the writers that, in order to

study their reasons for being involved in writing, we wanted them to rank-order the seven reasons in order of importance to them. After rank-ordering either the intrinsic reasons or the extrinsic reasons (depending on their condition), the writers were asked to write a short Haiku-style poem where the first and last lines consisted of the single word "Laughter." (Those in the control group were simply asked to write the poem, without completing any questionnaire at all.)

After the study was complete, we asked several poets to judge these poems on creativity. The results were dramatic. As you might expect, the writers in the control group wrote poems that were judged fairly high on creativity; these were, after all, creative writers. Here is an example of a poem from this group, judged high in creativity:

Laughter
Immortal, true
Blooms, inspires, sings
The song of all smiles
Laughter

The writers in the intrinsic group wrote poems that were judged as somewhat higher in creativity than those in the control group, but the difference was not large. Here is an example of a poem from this group, also judged high in creativity:

Laughter
Edgy, breathless
Fracturing, punctuating, breaks
Bullet-like gasps uncontrolled
Laughter

The most important result comes from the extrinsic group. Those writers produced poems that were judged as much lower in creativity than the poems produced by either of the other groups. An example:

Laughter
Cheerful, excited
Sharing, Opening, Expressing
A clear moment of peace
Laughter

Consider the implications of this study. These writers entered our laboratory with an intrinsic motivational orientation toward writing. Apparently, we were not able to increase that intrinsic orientation much; the creativity of the intrinsic group isn't notably higher

than the creativity of the control group. But with a terribly brief and simple manipulation, we significantly reduced the creativity of writers in the extrinsic group. People who had been writing creatively for years, who had long-standing interests in creative writing, suddenly found their creativity blocked after spending barely five minutes thinking about the extrinsic reasons for doing what they do.

(Lest you think that we took creative writers, stripped them of their creativity, and then turned them loose, let me say that we fully debriefed all of our participants before they left the lab, and we had all of the extrinsic subjects fill out the intrinsic questionnaire at the end of their experimental sessions.)

Intrinsic motivation, then, does seem to be more conducive to creativity than extrinsic motivation. Creativity can be undermined by evaluation expectation, surveillance, reward expectation, competition, or restriction of choice, and it can also be undermined by simply thinking about all the external constraints that might be placed on one's work.

Keeping Creativity Alive

If this is so, what can be done about it? Are we always at the mercy of our social environment? Is it impossible to be creative in the face of extrinsic constraints? How can managers and teachers and parents possibly avoid the potentially disastrous consequences of evaluation, reward, and competition?

The first solution is to focus on the social environment. As much as possible, those who oversee (or have an impact on) the performance of other people should try to take the emphasis off extrinsic constraints. Obviously, it would be impossible to eliminate the evaluation of performance or the use of reward systems or any of the other factors I've mentioned. But it is possible to reduce their salience, to place the focus more on the work itself and less on the external controls. For example, rather than constantly reminding workers about performance reviews, it might be more effective to encourage them to do *self-evaluations* of their own work. This could well result in work that is quite acceptable, because people can be very stringent self-evaluators. Simultaneously, creativity would be maintained, because people could concentrate on the work for its own sake, rather than focusing on external pressures.

The point is that anything reducing the salience of extrinsic constraints should enhance creativity. It might even be possible for workers themselves to do "mind tricks" that will make extrinsic constraints seem distant and unimportant. Earlier, I mentioned the fierce

competition that James Watson and Francis Crick felt with Linus Pauling during their search for the structure of DNA. In Watson's account, barely a page goes by without mention of Watson and Crick's obsession with trying to assess Pauling's progress and their chances of beating him to the Nobel Prize. Obviously, their creativity was not completely undermined by this extrinsic constraint; they did reach their goal. But a close examination of Watson's story suggests something very interesting. While they were actually in their laboratory, doing their best work, or pondering the problem during a quiet moment, they became so totally absorbed in the scientific puzzle that everything else receded in importance—including the competition with Pauling.

The second method for keeping creativity alive focuses not on the social environment but on the individual. If knowledge, technical skills, creativity techniques, and talents can be developed to high levels, it might still be possible under extrinsic motivation to produce work that is recognized as creative. Recall the three factors that contribute to creativity: domain-relevant skills, creativity-relevant skills, and task motivation. Even if task motivation is largely extrinsic, some levels of creativity might be achieved as long as domain-relevant and creativity-relevant skills remain at a high level.

There is some evidence that this happened with Picasso in the last years of his life. Some critics suggest that, during those last years, Picasso became so obsessed with the outrageously high prices his paintings commanded that he lost his "creative spark." We might say that he lost his intrinsic motivation. Yet, during those years, Picasso still succeeded in producing work that many people regarded as creative. It might be that he had actually developed an algorithm for producing a "creative" painting. Picasso might have had such an extraordinarily high level of talent and skill and knowledge that, almost by rote—without any particular spark of intrinsic motivation—he could produce work others would see as creative.

The third method for keeping creativity alive also focuses on the individual. If a person can start out with a very high level of intrinsic motivation, it might be virtually impossible to wipe it out with the imposition of extrinsic constraints. For ourselves, we can try as much as possible to concentrate on and appreciate the intrinsically rewarding aspects of our work. For those under our influence, we can try to emphasize those aspects of work and increase the intrinsic satisfactions of the work process itself. It might be a good idea, for example, to simply ask people what they most enjoy about their work and then allow them more time, freedom, and resources to build on those areas.

Woody Allen seems to present an ideal example of unshakeable intrinsic motivation (see Lax, 1975). Few professions are as loaded

with salient extrinsic constraints as moviemaking. Not only do millions of dollars rest on the success of each individual project but the product is evaluated by millions of people. Not only that, but expert evaluation of the movie by critics is available for hundreds of millions of people to see. Yet, in the face of all this constraint, Allen seems to continue along, quietly taking one risk after another with new forms and styles. In his interviews, he sounds highly intrinsically motivated. Certainly, he wants his projects to succeed financially. But he's not working primarily for the money; he's working to please and challenge himself. And he hardly seems concerned about evaluation of his work. He avoids reading reviews of his movies. And on the night that his *Annie Hall* received the most positive evaluation given to movies, the Oscar, Allen preferred to do something he *really* enjoyed—playing clarinet with his jazz band in Manhattan.

A person's creativity can be killed in an atmosphere fraught with evaluation pressures, reward systems, competition, restriction of choice, and anything else that takes the focus off the intrinsic properties of the work itself. But a person's creativity may be kept alive in an atmosphere with minimal extrinsic constraint and maximal support of skill training, talent development, and intrinsic enjoyment of the work. And, then, as much as possible, it helps to simply be left alone.

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Teresa Amabile prefaced her reading of this paper at Creativity Week VI by saying that she had spent the first ten years of her professional life studying how creativity in children can be ruined, and that now she is investigating how creativity in adults can be fostered.

The three necessary ingredients for effective creativity which are recorded here remain in her current model of creativity. She is now confronting the challenge of transporting her laboratory findings on enhancing task motivation to the workplace. (See her paper below with Sharon Sensabaugh.)

When I read this paper, it occurs to me that intrinsic motivation is like love. You know when you're feeling it but it's hard to describe with great precision. Managers who can help their people sustain intrinsic motivation can improve creative problem-solving activity in their organizations. But the task is not simple. As Teresa points out, it is easier to stifle creativity in the organizational context than to stimulate it—in part, because the forces which engender intrinsic motivation are subtle. You cannot command compliance when working with social-influence variables any more than you can order someone to be in love.

Teresa received her Ph.D. from Stanford University in 1977 and is currently a professor in psychology at Brandeis University. ***SSG.***

High Creativity Versus Low Creativity: What Makes the Difference?

Teresa M. Amabile and Sharon J. Sensabaugh

Take a moment to scan your memory, reviewing the past few years of your work experience. Try to identify an example of high creativity—an instance where you or your team succeeded in developing a creative, innovative idea. What was the context? How did it happen? Think of anything that might have made the difference between this and other, less creative events, in terms of the people involved and in terms of the work environment. Now identify an example of low creativity from your work experience—an instance where a creative, innovative solution was needed but it just never happened. Again, what was the context? How did it happen? What distinguished this event, in terms of the people involved and in terms of the work environment?

For years psychologists and business analysts have been speculating on the crucial determinants of creativity in organizations. Often, these speculations have been informed by studies scrutinizing the personalities and backgrounds of very creative people or by a handful of case studies of successful innovation. But many questions remained. Were the abilities and personalities of key individuals the most important determinants of creativity in organizations? Did aspects of the work environment also play a role? And did the small number of case studies really reveal general principles of the work environment?

Along with Stan Gryskiewicz, we tried to answer these questions by collecting a large number of stories about both successful and unsuccessful innovations from firsthand observers. To compare the stories, we focused specifically on one setting: the research-and-development laboratory.

The study had five major goals: (1) to identify the major factors that influence creativity both negatively and positively within the R&D setting: (2) to compare these with factors identified in other types of creativity studies; (3) to devise a reliable and valid methodology for describing the climate for creativity in any given R&D laboratory (and, indeed, in any organizational setting); (4) to devise techniques for assessing the creative productivity of people working within

it; and (5) to develop customized programs for improving the climate for creativity in any given R&D laboratory.

Method

The participants were 120 R&D scientists from over two dozen different corporations in the United States, Canada, Mexico, and Europe. They were interviewed individually for approximately twenty minutes each. The interview question, which participants received in advance, asked them to tell two stories of creativity from their work experiences: one that exemplified a high level of creativity (defining creativity in any way that they felt appropriate), and one that exemplified a low level of creativity. For each story they were asked to describe the event and the context and, in particular, anything about the persons involved or the work environment that distinguished this particular event.

The tape-recorded interviews were transcribed verbatim and subjected to a detailed content analysis for identification of the major factors influencing creativity in R&D. First, four major themes were identified and then, within each major theme, the most frequent subthemes were listed. Each stage of the content analysis was performed by two independent readers who marked segments of the transcripts according to the major themes and subthemes. Their level of agreement was quite high; any disagreements were settled by discussion to consensus. Further details on the analysis are reported elsewhere (Amabile & Gryskiewicz, 1987).

Results

Four main themes captured most of the comments in the content analysis of the interview transcripts: (1) environmental stimulants to creativity; (2) environmental obstacles to creativity; (3) favorable personal characteristics; and (4) unfavorable personal characteristics. *Environmental stimulants and obstacles* are defined as any factors outside the problem solver(s), including other people, that facilitated or inhibited creativity. *Personal characteristics* are defined as those factors operating within the individual or problem-solving group.

Through a process examining the specific comments falling under each of the above themes, subthemes were identified to give a clearer picture of the information captured by the main theme. The following sections include the most frequently mentioned subthemes

under each main theme, along with the illustrative quotes. The themes and subthemes are presented in decreasing order of frequency.

Environmental Stimulants to Creativity

Freedom and control. Over two-thirds of the participants interviewed mentioned freedom as an important factor in the work environment contributing to their creativity. Freedom is defined in this case as freedom to choose what to do or how to accomplish it. It involves a sense of control over one's work and ideas.

> The creative environment is one in which individuals are faced with fairly general missions or challenges but are free to determine the approach to solving these problems. They are free to develop definitions of problems and free to develop options for solutions.

> There was not a lot of restriction on our ability to try new things and to look at different ways of doing things. They did not manage us closely. Instead, we had responsibility and control. We had a lot of freedom, and when you have that kind of freedom, you tend to work a lot harder.

Good project management. Good project management includes a variety of features involved in the effective managing of individual projects. Over one-half of the participants interviewed made comments about good project management. Some of the features mentioned were good planning and organization, clear goal and problem definition, and good communication. Also, a manager with good interpersonal skills exhibited faith in the project team and served as a positive role model.

> As a manager, you have to take the risk and let people deviate from the path once in a while. You must have faith in people, give them a looser rein.

> There wasn't a lot of jealousy or bickering over silly things. We had great open communication. I would try to give each person working on it the idea that they can each contribute to a goal, and I would make that goal clear. But I wasn't going to tell them how and what to do. I tried to discover their talents and what they do best and like to do, and then I turned them loose.

Sufficient resources. One-half of those interviewed mentioned having access to appropriate resources—including money, equipment, information, and people—as being a stimulant to their creativity.

> He was successful partly because he had access to the proper kind of equipment and tools. By that I mean both hardware and adequate computing facilities.

> Something very important was the support provided. There was an allocation of people and capabilities throughout the organization. It was possible to get lots of diverse information.

Various organizational characteristics. This subtheme captured comments about the organization as a whole. The optimal organization might be described as having a collaborative atmosphere, a high expectation of creativity, an acceptance of failure, and a nonbureaucratic structure. Well over one-third of the managers made comments included in this subtheme.

> The organization is willing to give people the opportunity to try and will accept failure. In addition, it is friendly, with little red tape, high trust, and open communication from all levels.

> The company made a commitment. There was an environment in this company that prized creative solutions to problems and wonderful things happened.

Environmental Obstacles to Creativity

Various organizational characteristics. Over one-half of those interviewed spoke of a general organizational policy or structure as being a hindrance to their creativity. This category included comments concerning inappropriate reward systems, as illustrated by the second quotation, and comments about the organizational culture, i.e., too frequent meetings, status issues, and poor communication between divisions. These were just a few of the factors mentioned by participants. Organizational characteristics, taken together, constitute the most frequently mentioned obstacle to creativity.

> The structure I'm working in is not matrix management but matrix mismanagement. I am reporting to too many different organizations and I seem to be part of too many different organizations all at once.

> The problem is that there is a tendency to drive people toward management—that is the way to move up—and no drive to keep them in the technical side. There is a dual ladder system, but it is clearly not an equitable situation. One ladder is shorter than the other.

Constraint. These comments illustrate a major environmental obstacle to creativity—constraint. Constraint is defined as a lack of freedom or choice in deciding what to do or how to go about it. Approximately one-half of the participants indicated this as an obstacle to their creativity or the creativity of the group. This fits nicely with the data concerning environmental stimulants. Just as freedom is seen as an important stimulant to creativity, constraint is seen as a major obstacle.

> That was a low-creativity situation because they wanted me to follow a particular path without adding any of my input into it. If you want to use your creativity, you can't be told the exact way something should be done.

> I was forced to work on the project along the lines that were indicated. The work that I really wanted to do was done in spite of it. But for that, I got a totally negative reaction from management. I was told not to mess around with this because it was too far out. The result was a disaster.

Organizational disinterest. The lack of psychological support within the organization is evident in this subtheme: little faith in the project's success and a lack of enthusiasm and interest. This sometimes results in an apathetic, complacent attitude toward the work. Over one-third of the managers revealed this as an obstacle to creativity.

> Our major obstacle was that a similar synthesis program had been started at a different site and had been unsuccessful. Therefore, we had the stigma that it couldn't be done even before we started. There were a lot of disbelievers.

> From the beginning, the concept really lacked any innovative thought. It was a defensive strategy; instead of looking for a concept that would be one step beyond what was currently available, we settled for coming out with something that was a "me too" product.

Poor project management. One-third of the managers commented on the management of the projects as inhibiting. Some specific examples of poor project management included poor planning and organization, unrealistic expectations or time frames, poor communication skills, and low expectation of success. Just as good project management facilitated creativity by communicating a clear goal while allowing some freedom in the accomplishment of that goal, poor project management often combined an unclear goal with a very directive approach to the individual tasks.

> There were too many people involved in the project, and too many inputs being put into it to determine what the project should be. The inputs were changing with time so there was not a well-defined goal for the people involved.

> Our project work suffered because goals weren't being set; it's hard to work without certain goals in mind. The supervisor wasn't good at making decisions.

Favorable Personal Characteristics

Many of the comments described characteristics of the people involved. Those descriptions most frequently used fell into the following subthemes:

Self-motivation. The person (or persons) was described as internally motivated, enthusiastic, excited, and highly involved.

Special cognitive abilities. This category captured comments about an individual's special problem-solving skills, such as analytical reasoning or intuition.

Risk-orientation. Qualities included here were an individual capacity or attraction for taking risks and playing against the odds. Such qualities included unconventional attitudes and style and an attraction to challenge.

The following are some examples of the comments made concerning individual style and behavior:

> The difference between high and low creativity? I think seventy-five percent of it is the person. A person has to be somewhat self-motivated. The person has to have an inner drive. I don't know how a manager can motivate someone if they don't have that inner drive already.

> A certain amount of intuition can help.

> In this group, people were not afraid to step over the boundary lines. Because this is a frontier type of chemistry, your mind-set has to be such that you can accept that your results are going to be new, and that you won't know exactly what to do with them.

Unfavorable Personal Characteristics

This theme had the fewest of all responses. It accounted for less than ten percent of the total number of comments made. From those characteristics mentioned, three major subthemes emerged:

Lack of motivation. The individual was described as bored or lacking commitment, being pessimistic or complacent toward the work.

Lack of skill. An individual might not have the necessary knowledge or experience to perform adequately.

Inflexible. A person might have strong opinions or preconceptions with little willingness to change.

As with environmental factors, there is a close correspondence between favorable and unfavorable personal qualities. Just as self-motivation was seen as a positive influence on creativity, a lack of motivation is seen as a detriment.

> If one person doesn't care and doesn't do his job right, it affects the whole team because a piece of the puzzle will be missing. There's a lack of commitment.

> My own preconceptions served as an obstacle.

> It's hard to tell what the problem was with these people. Most of them just stood around and did nothing all day.

Conclusion

We undertook this study with the aim of identifying the major influences on creativity in a particular organizational setting—the R&D laboratory. We found that, although personal qualities of the persons involved did play an important role, it was features of the work environment that appeared most prominently in these stories of high and low creativity. In both the stories of high creativity and the stories of low creativity, participants most frequently mentioned environmental factors as important in determining the outcome. Certainly, personality traits and general abilities did appear in these

stories; if creativity is desired, it does help to have talented, self-motivated individuals. Perhaps, though, nearly everyone hired into these high-powered R&D laboratories is already so skilled that, in fact, the difference between creative and uncreative outcomes will be determined by the organizational environment in which they work.

In many ways, these results fit well with other studies of creativity. Decades of creativity research have revealed that an individual's creativity depends on three types of factors: domain-relevant skills (knowledge, talent, and experience in the particular domain of endeavor); creativity-relevant skills (styles of thinking and working that are particularly conducive to creativity); and task motivation (an individual's perceptions of this motivation for undertaking a particular task—Amabile, 1983a).

Recent research has shown that the third component, task motivation, can be a particularly powerful determinant of creative behavior and, moreover, that task motivation can be strongly affected by the work environment (Amabile, 1983a; 1983b). Task motivation can be categorized into two main types. Intrinsic motivation is the motivation to do something primarily for its own sake—because it is interesting, enjoyable, challenging, intriguing, or in some other way intrinsically satisfying. Extrinsic motivation is the motivation to do something primarily in order to achieve some extrinsic goal, such as gaining a reward, meeting a deadline, obtaining a favorable evaluation, winning a competition, or accommodating procedural constraints imposed by someone else (Deci, 1975). A number of experiments have shown, first, that intrinsic motivation can be changed to extrinsic motivation by the imposition of environmental constraints such as

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reward structures, evaluation structures, procedural restrictions, and deadlines (Deci & Ryan, 1985), and, second, that the imposition of such constraints also results in a decrease in creativity (Amabile, 1983b).

These findings are summarized in the intrinsic motivation principle of creativity: People will be most creative when they feel motivated primarily by the interest, enjoyment, satisfaction, and challenge of the work itself—and not by external pressures. The experiments testing this principle employed a carefully controlled paradigm. In these studies, subjects of various age groups and backgrounds performed one of several types of creativity tasks under either the presence or the absence of some environmental constraint (such as offered reward, expected evaluation, or surveillance). Subsequently, when subjects' work was rated on creativity by experts in the task domain, the work produced by subjects who had been constrained was consistently rated as lower on creativity than that produced by nonconstrained subjects.

The results of this R&D study provide clear support for the intrinsic motivation principle of creativity; highly creative events in R&D were most likely to occur in an atmosphere of freedom rather than constraint, with highly self-motivated individuals. Not only does this study provide a conceptual replication of the laboratory experiments on creativity, it goes beyond the results of those experiments by pointing to a number of factors in the work environment that can serve as stimulants to creativity.

The implications of this study for managing creativity and innovation are rich: (1) It is important to staff not only for skills and experience but also for a high level of intrinsic motivation. (2) Managers should identify and fortify those elements of the work environment that we have shown to serve as stimulants to creativity. (3) Managers should also identify and eliminate those elements of the work environment that we have shown to serve as obstacles to creativity. If these steps can be taken, not only should individual motivation and individual creativity increase but, as a consequence, organizational innovation should flourish as well.

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This paper provides an overview of Creativity in the R&D Lab *(Amabile & Gryskiewicz, 1987). Teresa Amabile headed the team that did the research reported on in that publication, and Sharon Sensabaugh (now D'Allura) was an active member of the team.*

Sharon began her professional career at the Center after receiving her degree in psychology from the University of North Carolina at Greensboro. She was interested in both *applications and research in R&D settings, and her research experiences were an asset when she participated in the development of the Center's training simulation for R&D managers (RADMIS®).*

What is described here is actually the developmental stages of the Work Environment Inventory (see the article in this volume by Nancy Koester and Robert M. Burnside). The initial factors and themes of the inventory have now been integrated mathematically and conceptually. As a result, we currently have a more user-friendly instrument. We couldn't have done this, however, without the early work of Teresa and Sharon. ***SSG.***

Creativity and Leadership: Causal Convergence and Divergence

Dean Keith Simonton

If we are to judge from the research literature on the subject, creativity and leadership appear to be two very different topics. Creativity appears to attract the attention of more personality and educational psychologists, whereas leadership seems to fascinate more social and organizational psychologists. This separation is unfortunate, I believe, for in many respects these two phenomena can be subsumed under a single generic definition. Social psychologists are fond of defining a leader as that group member who exerts more influence over group performance and decision making than others. By this definition, creators are leaders, too, of a certain kind. A creative scientific researcher, for example, is one whose publications command respect in the scientific community, a respect that is displayed in the citations that the researcher receives in the professional literature. Those scientists who are less creative are not so acknowledged as leaders within their disciplines. The definitional similarity between creativity and leadership becomes particularly pronounced when we turn our attention to those creators and leaders who have in some sense "made history." Clearly if someone is of sufficient importance to be found in encyclopedias, biographical dictionaries, and histories, that person can be said to have stood well above his or her contemporaries in influence, the specific nature of the achievement making little difference. Indeed, if the achievement is big enough, we often label the person a "genius"—as a kind of generic designation for any truly outstanding manifestation of creativity or leadership.

But the comparability of creators and leaders is not merely analytical; it is empirical as well. Many of the variables that are crucial to our understanding of creativity are also of value to our appreciation of leadership. Sometimes these factors operate in the same way, and other times in quite contrasting ways, but in either case their influence is felt. I have devoted a whole book to such etiological comparisons (Simonton, 1984a), so my intention here is to offer an abstract of what may be considered the more important points. What I will do specifically is go over five areas where these comparisons seem most instructive: birth order, formal education, productivity, age, and zeitgeist.

Birth Order

Francis Galton (1874) pointed out long ago that the firstborn child is overrepresented among those who attain distinction in scientific endeavors. A number of explanations have been offered for this finding. One possibility is that the firstborn is the favored child into whose development and education the parents channel most of their resources. Another explanation is provided by Zajonc's (1976) confluence model of intellectual development: The firstborn child is exposed to an environment at a higher level of maturity than the later-born children, who are overexposed to literally infantile minds. However, both of these interpretations must face the ugly fact that the last-born child also enjoys a high probability of success, though still not as great as the firstborn (Ellis, 1904). This finding may suggest that some kind of favoritism is operating in the form of a serial-position effect, the firstborn being the most spoiled for being first, the last born spoiled the next most for being the last of a series. We must not conclude that the middle children are invariably left out in the cold, nonetheless. One study of three hundred eminent twentieth-century personalities found that the politicians in their sample were likely to be middle children (Goertzel, Goertzel, & Goertzel, 1978). This result suggests that birth order may be crucial to the development of certain requisite social skills. The middle child, always caught between older and younger siblings, has plenty of opportunity for learning how to negotiate, compromise, and reconcile differences. An only child has no chance at all to nourish these abilities, at least not in the home.

Actually, the connection between birth order and success as a political leader may be a bit more complicated. Stewart (1977) has put forward a theory that the optimal birth order for a potential leader may depend on the political circumstances, or zeitgeist, in which he comes to power (his focus is on males). On the one hand, leadership styles are said to correspond to four unique sibling configurations: the only, firstborn, middle, and last-born child. Each configuration gives the child a special set of experiences during early development, experiences that help shape personality. On the other hand, four varieties of crises determine which leadership style is appropriate: the breakdown of social institutions; imperialistic expansion and confrontation; retrenchment and realignment of domestic and foreign commitments; and rebellion and revolt. According to Stewart, the first of these crises is the proper province of only children, the second of the firstborn, the third of the middle child, and the fourth of the last born. To make the case for his theory, Stewart studied the birth order and political zeitgeist for American presidents and British prime ministers, and obtains statistical endorsement. Curiously, the two leading candidates

for the presidency in any given election year display a distinct tendency to be of the same ordinal position in their respective families. Moreover, other researchers have found results consistent with the theory. Revolutionaries, for example, are more likely to be later-born children (Walberg, Rasher, & Parkerson, 1980). Even the Goertzels' conclusion that the politicians in their sample were predominantly middle children bolsters Stewart's theory. Most of the politicians in the Goertzels' study attained their power positions in the post-World War II period, when domestic and foreign commitments were being remade and consolidated—putting a premium on negotiation skills. The days of the firstborn war leaders were over.

The main point is that birth order may exert an influence on the personality development responsible for achievement, whether as a leader or as a creator. It is of interest to speculate on how creators might fit into Stewart's interactionist theory. Are the revolutionaries in a creative endeavor more inclined to be later-born children? Are those creators who fight their way to dominating positions of prestige and influence more prone to be firstborns? And are middle children more disposed to become the administrators in research institutions?

Formal Education

The formal training we receive in our schools, colleges, and universities may be a mixed blessing. On the positive side, we can definitely argue that success in life requires a great many special skills that can only be acquired with an enforced discipline which only our educational systems conveniently provide. These skills range from reading to running a linear accelerator. On the negative side, there also can be little doubt that formal education can inculcate a certain conformity of thought, even rigidity, that may hamper innovation. Therefore, it is conceivable that the relation between formal education and achievement follows a curvilinear, inverted-U function. Two studies show this may indeed be the case (Simonton, 1983).

In the first investigation I reexamined the 301 geniuses collected by Catherine Cox (1926) in her famous study of the association between achievement and intelligence (Simonton, 1976a). This sample included both creators and leaders. They all were scored on achieved eminence using Cattell's (1903) rankings. In addition, I devised a coding scheme for scaling the level of formal education they attained. I then did a test for curvilinear relationships using a multiple regression analysis. For the leaders the relationship was strictly linear, not curvilinear, but *negative*. That is, the most acclaimed (or cursed) leaders were those who had the least formal training. In the case of

creators, however, the expected relationship appeared—an inverted-J curve in fact. Recipients of doctoral degrees were at a distinct disadvantage even in comparison to those with no college, and a peak occurred in the level of education that maximally contributed to attainment. That optimum point occurred somewhere between the junior and senior years of college. Up to around the third year, increasing formal education increases the chances of success, but thereafter additional education was negatively associated with achievement.

This finding is interesting, but it should not be accepted without first obtaining corroborating evidence. Such support came from a second study, and from a very unlikely quarter—an inquiry into American presidents (Simonton, 1981b). Maranell (1970) had 571 American historians rate 33 presidents (Washington through Lyndon Johnson, skipping W. H. Harrison and Garfield). The historians evaluated the presidents on several dimensions. For our purposes, two dimensions are pertinent—flexibility versus inflexibility, and idealism versus pragmatism. It turns out that these two dimensions are related: idealistic presidents tend to be inflexible, pragmatic ones flexible. Accordingly, a single dimension was created which I styled "dogmatism" (i.e., idealistic inflexibility). Now there is much research that suggests that creativity and dogmatism are negatively related (Simonton, 1983). If this is so, it follows that the impact of formal education on dogmatism should be the reverse of that on creativity. In other words, the graph for the 33 presidents should be a reflection of that of Cox's creators. That is exactly what is found. The most dogmatic presidents are those with higher degrees, such as Dr. Wilson; the next most dogmatic are those with very little formal education, such as the totally unschooled Andrew Johnson. The least dogmatic—that is, the most pragmatic and flexible—were those who left college somewhere between their junior and senior years—precisely as was found before. Thus, as unlikely as it seems, the data for the 33 presidents fits almost perfectly that for the creators in the Cox sample. The only assumption we have to make is that creativity and dogmatism are inversely related.

Now I realize that there are a number of objections that may be raised to the above two studies. For one thing, the average birth year for the Cox sample is 1705, that for the 33 presidents 1820, and hence the results may not apply to twentieth-century personalities. Moreover, it can be argued that even though the curvilinear relationships hold for some creative activities, other disciplines may require more formal training for maximal chances of success. For example, even if a doctoral degree in the fine arts is detrimental, the sciences require greater technical competence and hence a doctoral degree may be

desirable. To handle these two objections I conducted a third study, this time using the 314 eminent twentieth-century personalities collected by the Goertzels (Simonton, 1984a, chap. 4). Since their birth years are as recent as 1948 (with an average of 1902), we are dealing with more contemporary subjects. Furthermore, I separated those who attained distinction in the sciences from those who made their names in the arts and humanities. In addition to these two domains of creativity, I examined recent political leaders. Both leaders and creators were then scaled for achieved eminence and formal educational level. In the instance of the leaders, a marked contrast was observed with what was found for the leaders in the Cox sample: The function was described by a curvilinear curve with a peak at some modest amount of graduate education. Perhaps the greater complexity of modern political systems requires greater educational attainments, and the peak seems to coincide with the level of training reached by lawyer-politicians in most democratic societies. A similar function was found for scientists, only the peak is shifted a bit later, at some graduate education just shy of a Ph.D. This result endorses my conjecture that more technical disciplines require more formal training. Finally, the curve for the creators in the arts and humanities exhibits an inverted-U form, too, but in this case the peak falls somewhere between the junior and senior years of college—precisely as learned in the previous two investigations. Hence, I have succeeded in replicating the curvilinear function in a sample of more contemporary subjects, many of whom are still living and active.

To be sure, we do not know why the curvilinear relationship holds. One interpretation would be that excessive formal education actively inhibits creative development by stamping in a conformist perspective. An alternative is to say simply that beyond a certain point formal education becomes merely irrelevant to further creative development and so the more self-directed creators tend to drop out after the irrelevancy becomes apparent. But whatever the explanation, it is fair to say that a maximal amount of formal education is not always the optimal amount.

Productivity

Thomas Edison took out almost 1,300 patents over his career, still more than any other inventor. No wonder, then, that he said that genius was 90 percent perspiration! And Edison's case can be considered fairly typical. Earlier we defined a leader as one who exerts more influence than average, and noted that creators are leaders who exert their influence in the form of notable contributions. A number of

researchers have shown, in fact, that a small percentage of workers in any given field of creative activity account for a disproportionate amount of contributions to their discipline (Dennis, 1955; Price, 1963). The top 10 percent most productive creators are responsible for about half of all contributions, whereas the 50 percent least productive are responsible for only about 15 percent of all contributions. The most productive contributor is at least 100 times more productive than the least productive, for whom the modal number of contributions is one. This means that the distribution of contributions is highly skewed. The plurality of creative individuals produce only one contribution each, a smaller proportion only two each, and so on, until a mere handful make as many as 100 contributions or more. According to Lotka's law, the number of creators who produce n contributions (e.g., patents and publications) is inversely proportional to n^2, a function that yields a fast drop-off and a long tail (Lotka, 1926). This formal expression is remarkable because of its similarity with Pareto's law of income distribution in which income is inversely proportional to $n^{1.5}$ (Price, 1963). Productive output, like income, tends to be equally distributed, a small, even elite, group accounting for a lion's share of the "wealth." Price's law expresses the same idea in a slightly different but perhaps more instructive way: Half of all contributions to a particular endeavor is produced by the square root of the total number of creators working in that field (Price, 1963). For example, if 100 scientists make up a certain enterprise, 10 will be responsible for half of all papers; whereas if 10,000 work in a popular area, 100 will account for half of the publications. Price's law implies that as a creative discipline grows, the proportion of contributors who are responsible for half of all output shrinks. If 100 are in the area, 10 percent account for half; but if 10,000 are in the area, only 1 percent do. Thus as a field expands it becomes ever more elitist.

We have been speaking of total, lifetime productivity. There are three components to this final score: The creator can begin to produce at an early age, to produce at an exceptionally high annual rate, and to produce until quite late in life. Although there is no mathematical or logical reason for these three components to be associated—indeed, many people subscribe to the folklore belief that those who are prodigiously productive at a precocious age will be subject to early burnout—the three components are in fact positively related to one another (Dennis, 1954a, 1954b; Simonton, 1977b). Those creative individuals who begin their careers earlier tend to end them later, and to maintain high productivity rates throughout their careers (at one period during Edison's long career he was averaging a patent every five days). I have proposed a mathematical theory, too elaborate to discuss here, that predicts that these three components must all correlate due

to their common dependence on a variable called "creative potential" (Simonton, 1984b). Another explanation of their interrelationship stems from the doctrine of cumulative advantage (Merton, 1968). Those who publish first will receive rewards first, and those rewards will reinforce further output at higher rates and for a longer duration. In a sense, creative individuals are like rats in a Skinner box receiving food pellets for bar pressing: The first to catch on to the trick and press the lever will get a head start in the rat race for ever more rewards.

Total lifetime output, however generated, is not synonymous with influence, naturally. There are "mass producers" who are prolific but trivial, and "perfectionists" who put out a handful of quality contributions. Even so, empirical research has shown that quality tends to be the consequence of quantity (Simonton, 1981a). In fact, a constant-probability-of-success model seems to be operating so that the proportion of hits over misses tends to be relatively even across contributors. Those who produce more masterworks also produce more rubbish. Thus, the best approach is to massively generate ideas in the hope that some pan out. This, of course, is the notion underlying "brainstorming" and similar techniques. This approach also has a theoretical justification in Campbell's (1960) random-variation and selective-retention model of creativity that develops an analogy with the operation of natural selection in the biological world.

The above remarks are based on studies of creators, not leaders. Nonetheless, I think the same principles may apply to leaders, especially to creative leaders. A truly great leader is one who begins generating ideas at an early age, keeps on producing ideas at a prolific rate, and continues the process for many years, never seeming to run out of steam. Even if some ideas prove to be off the mark, the constant-probability-of-success model may assure that enough hits will come to make the effort profitable. The doctrine of cumulative advantage may also prove germane. In the realm of leadership, as in creativity, the rich may indeed get richer; the poor, poorer. Initial success breeds further success, and advantage accumulates to those who start off on the right foot. In military leadership, for example, there is an almost perfect correlation between the number of battles fought and the number won (Simonton, 1980a). Finally, it may be that Lotka's and Price's laws may be descriptive of the achievement of leaders too. A small elite may be responsible for a disproportionate number of innovative ideas, whether they be in government or in the private sector.

Age

A creator's lifetime productive output, needless to say, is not distributed evenly throughout a career—nor is achievement generally. Harvey C. Lehman has systematically documented the agewise distribution in his book *Age and Achievement* (1953). In broad terms, creative output in most fields tends to rise fairly rapidly to a peak in the late thirties or early forties and thereafter decline somewhat gradually. Recent investigations have established Lehman's chief results (Simonton, 1977a, 1984b). To be sure, the precise nature of the age function is a bit more complicated. In some fields, such as mathematics and poetry, the ascent to an early peak is quite sudden, as is the plunge afterwards. In other disciplines, such as scholarship, the peak occurs much later in life and the decline is virtually nonexistent. But for the most part the fortieth year appears to be the highwater mark of creative achievement.

Interestingly, a similar peak may hold for some types of leadership. A study of military success on the battlefield found that those generals who were closest to age 45 were more likely to exhibit superior military competence and experience (Simonton, 1980a). Another inquiry into absolute monarchs discovered a peak age for political success around age 42 (Simonton, 1984c). Here, too, the exact placement of the peak depends on the endeavor: Revolutionaries tend to be young, heads of state in established political systems old; founders of religions are usually young, those leaders top in the hierarchy of established faiths old. And in the case of American presidents, the best age for getting elected seems to be in the late fifties (Lehman, 1953). Nonetheless, the early forties still appears to be a good point estimate, especially in those areas that require creative (rather than traditional) leadership. This may even be true in the economic sphere: 40 years is the approximate peak age of wage attainment, for example (Stolzenberg, 1975).

The question that now comes to mind is why achievement tends to be a curvilinear function of age. Though it is impossible to offer a complete answer here, I should briefly describe two theories. The oldest, by Beard (1874), proposes that creativity is a function of two factors, enthusiasm and experience. Enthusiasm without experience produces original work only, whereas experience without enthusiasm produces routine work only. Since enthusiasm rises quickly up to the early thirties and then just as quickly declines, while experience grows continuously, the optimum age emerges in the late thirties where the conjunction is maximal. One nice asset of this theory is that it helps explain why creativity may peak at different ages for various disciplines. Poetry, mathematics, religious innovation, and political revolu-

tion all likely require more enthusiasm, but scholarship, religious administration, and political consolidation all demand more experience. The main drawback of Beard's model may be that it does not make precise predictions. The second theory, recently proposed by myself and mentioned briefly above (Simonton, 1984b), is actually a mathematical model which predicts the productivity rate for each year of a creator's career. In simple terms, this model assumes that each individual begins with an initial supply of creative potential which is then transformed into actual contributions through a series of cognitive operations. This model explains different peak ages according to the different information-processing needs of a given discipline, and, as noted before, accounts for certain features of individual variation in productivity. One intriguing implication of the model is its prediction that creativity never really has to end, even when the creator is quite old. As the model has it, most creators die without fully actualizing their creative potential.

This last point brings us to one final precaution about interpreting the age curve found for achievement. It would be erroneous to discount the contributions of persons simply because they appear to be older than the peak age. Previously we spoke of the constant-probability-of-success model that asserts that quality is a repercussion of quantity. This model has been shown to hold across the life span too (Simonton, 1977a). That is, the proportion of successful contributions to total output remains constant with age. Hence, even if elderly persons are less prolific than those in their "prime," the probability that any given product will have an impact is not a function of age. The efforts of mature contributors must therefore be taken with equal seriousness to those of their junior colleagues.

Zeitgeist

Up to this point my emphasis has been on the psychological variables behind creativity and leadership. Yet I received my degree in social psychology, and so it should come as no surprise that I have devoted a considerable part of my own research to discovering how the sociocultural milieu affects the appearance of creativity and leadership. For example, I have published several inquiries into the adverse effect that warfare has on scientific innovation (Simonton, 1976b, 1980b). I have also shown how political violence affects, and is a partial consequence of, the prevailing ideological stance of a generation (Simonton, 1976d). But perhaps the most characteristic studies are those I have done to determine the relative importance of zeitgeist, genius, and chance in creativity and leadership. By *zeitgeist* I mean those social and cultural context (or situational) factors beyond the control of any single individual; genius is taken to signify an exceptional set of personal qualities. Chance is sort of what is left over—the residual complex of myriad inconsistent effects that defy classification. Anyhow, I have scrutinized political and military leaders along with musical, philosophical, and scientific creators to weigh the comparative impact of these three factors (e.g., Simonton, 1976c, 1979, 1980a, 1980c, 1984d). Two illustrations must suffice.

In the case of military leadership, both individual and situational factors prove to be germane to the prediction of tactical victory (Simonton, 1980a). The general who takes the initiative by attacking first has the best odds of success (and younger generals are more prone to be aggressive in this respect than older generals). On the other hand, the side that fights under a divided command where two or more generals are equal partners in tactical planning and execution tends to be more successful. This falls into line with the research on problem solving. For simple problems, individuals working alone do as well as individuals working in groups, but for complex problems individuals do better if they can pool their abilities in a group. The decision-making processes required on the battlefield are complicated, if nothing else, and hence it is to be expected that collaborating generals do better than those working alone. In any event, several individual and situational factors emerged as good predictors; though the individual predictors were the best predictors of tactical victory, situational predictors were best predictors of a battle casualty advantage (army size being the most important). In either case, the predictive accuracy was not perfect. The victor, for instance, could only be predicted 71 percent of the time, leaving some room for chance to operate.

In scientific creativity, too, all three factors participate. To demonstrate this fact I examined the phenomenon of independent discovery and invention—what Merton (1961) calls "multiples." Classic cases include the independent invention of the calculus by Newton and Leibniz and the independent formulation of the principle of natural selection by Darwin and Wallace. Proponents of a zeitgeist position have often argued that instances of multiples—and hundreds of cases exist—prove that scientific progress is essentially inevitable and that genius per se is more or less irrelevant to that progress (Ogburn & Thomas, 1922). On first glance this argument certainly looks watertight. Nevertheless, when cases of multiples are subjected to detailed mathematical analysis, a different picture emerges (Simonton, 1978, 1979).

In the first place, genius does play a role. For example, the more highly productive scientists also tend to be the ones who participate in multiples. Even more critically, chance seems to play the biggest part in the appearance of multiples. The overwhelming majority of multiples are doublets involving just two independent discoverers, the next most frequent is the triplet, then the quadruplet, and so on. The more scientists involved in a multiple, the more rare the event. This distribution is very peculiar, and, in fact, it can be shown to hold for extremely rare events (namely, it is a Poisson distribution with a small mean). As a consequence, singletons, or discoveries made only once, are more commonplace than doublets and, even more significantly, nulltons, or discoveries never made at all because luck ran out on them, are very common as well. Hence, scientific progress is far from inevitable. Although the zeitgeist exerts some influence on the operation of genius (mostly in the rank-ordering of events), chance seems to govern more than anything else what actually ends up in the annals of scientific discoveries and inventions.

The principal conclusion to be drawn from these studies is that creativity and leadership do not function totally at the individual level. Rather, if the situational context moderates the manifestation of even high-level geniuses, can we expect that our own enterprises on a more mundane plane are any less subject to the milieu? And if the history-making leaders and creators are subject at least in part to the whims of luck, certainly we all must take that factor into account. Yet, as we saw in the section on productivity, we can also take advantage of chance for our own purposes: Chance can be an instrument as well as a determinant.

Conclusion

One objection that can be raised against the above review is that much of it is based on historimetric studies of distinguished creators and leaders. Most of us venture far humbler designs. Maybe our best hope is to make a comfortable living or to keep ahead of the pack. Nonetheless, an interest in creative leadership implies some ambition, and I maintain that it's only a matter of degree, not kind, between those who make history and those who leave a mark in some more subtle fashion. And even if the foregoing findings may not always help us to become creative leaders, they should increase our sensitivity to those who display creative leadership themselves. Such factors as birth order, formal education, productivity, age, and zeitgeist may be useful constructs for organizing that awareness.

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Dean Keith Simonton has pursued, in a very persistent manner, the precursors and concomitants of effectiveness in creativity and leadership. He is the author of many articles and presentations since his appearance at Creativity Week VI (see the partial list below).

His longitudinal macroview of the context of creative leadership is both intriguing and daunting. In this view, we are all linked together as striving human beings, as we face the forces of circumstance and zeitgeist. Individual accomplishments and failures disappear in this situation. But perhaps there is an encouraging, unifying thread: Win or lose, the creator, the leader, the inventor, or the military general all share a willingness to persist and a readiness to take some calculated risk. Neither creativity nor leadership seems to be for the timid or lazy, whenever or wherever we were born.

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Adaptors and Innovators: Problem-solvers in Organizations

M. J. Kirton

Adaption-innovation theory defines and measures an individual's style of decision making, problem solving, and, by implication, creativity (Kirton 1976, 1987a). The concept of level or capacity is explicitly and completely excluded from the definition of style, which is the individual's characteristic manner of undertaking problem solving. Style includes the tendency either to accept the problem as consensually perceived or to view it, together sometimes with its own setting (or in other words "the paradigm"), as made up of processable parts of a problem to be solved. Style, therefore, also includes the kind of solution or cognitive production elicited by the problems in relation to the prevailing paradigms—being at the extremes either paradigm-supporting or paradigm-cracking. Care has been taken in validating the measure of the theory (the Kirton adaption-innovation theory, or KAI) to test whether, as the theory demands , it is unrelated (or, to be precise, insignificantly related) to measures of level. Two sets of data are available (Kirton, 1987b) to demonstrate such orthogonality. The first are the results from four countries in five studies involving ten IQ tests and over 1,600 subjects, which yielded 13 correlations ranging between the magnitudes of -0.14 to +0.12. The second set of results were based on data collected by Torrance and Horng (1980) in which 18 measures of creativity (including KAI) were intercorrelated. The usual muddled matrix emerged with correlations ranging between small minus to largish plus, without any obvious rationale. Adaption-innovation theory does supply a rationale: Psychometrically good scales of pure level should correlate significantly with each other but insignificantly with psychometrically good scales of pure style. Before factor-analyzing the results, therefore, a prediction could be made that two factors would emerge with many scales making heavy (0.3+) contribution to only one factor (pure scales) and some others to both (impure scales). The remaining scales (unreliable or invalid) would be isolated each to their own factor. The results fitted perfectly to the prediction, with KAI appearing as a style measure with such others as Right-Left Brain Hemispheric Preference (see Table 1, p. 46).

Table 1. *Factor Analysis Torrance Matrix*

Scales		Factors*	
		One	Two
Left hemisphere style of thinking (Form C)	Torrance, Reynolds, Bill, and Riegel, 1978	0.84	—
Right hemisphere style of thinking (Form C)		0.76	—
Creative personality (WKPAY)**	Khatena and Torrance, 1976	0.72	—
KAI	Kirton, 1976*	0.66	—
Creative self-perception (SAM)**	Khatena and Torrance, 1976	0.57	—
Creative motivation	Torrance, 1971	0.56	0.33
Cue test	Stein, 1975	0.42	—
Originality (Rorschach)	Hertz, 1946	0.35	—
TTCT fluency	Torrance, 1974	—	0.87
TTCT originality		0.35	0.84
TTCT flexibility		0.33	0.69
TTCT elaboration		0.35	0.67
Possible jobs	Gershon and Guilford, 1963	—	0.41
Similies	Schaefer, 1971	—	0.36
Movement (Rorschach)	Hertz, 1946	—	0.31
(Cumulative eigenvalue %)		(50.5)	(67.7)

*Only loadings ≥ 0.30 entered—KAI weakened as blind item scored in error. Analysis on data provided by kind permission of Professor E. Torrance (see Torrance and Horng, 1980).
Tests not loading 0.30 on either factor: Integrated Hem. S.T. (heaviest loading on Factor 3); Seeing problems—Guilford, 1969 (Factor 4); TTCT Creative strengths checklist (Factor 5).

**WKPAY—What Kind of Person Are You? SAM—Something About Me. These are two components of the Khatena-Torrance Creative Perception Inventory.

The separation of the concepts of style and level permits the former to be related or even integrated into personality theory, and herein later reference is made to many studies relating KAI to trait measures. So, according to the adaption-innovation theory, everyone can be located on a continuum ranging from highly adaptive to highly innovative according to their score on the Kirton Adaption-Innovation Inventory. The range of responses is relatively fixed and stable (see Table 2, p. 48), and, in the general population, approaches the normal curve distribution. For the purpose of clarity, the following descriptions are those that characterize individuals located at the ends of the continuum.

Adaptors characteristically produce a sufficiency of ideas, based closely on, but stretching, existing agreed definitions of the problem and likely solutions. They look at these in detail and proceed within the established mores (theories, policies, practices) of their organizations. Much of their effort when initiating change is in improving the "doing better" (which tends to dominate management, e.g. Drucker, 1969).

Innovators, by contrast, have a taste for producing a proliferation of ideas; they are more likely in the pursuit of change to reconstruct the problem (separating it from its enveloping accepted thought, paradigms, and customary viewpoints) and to emerge with much less expected, and probably less acceptable, solutions (see Figure 1, p. 49). They are less concerned with "doing things better" than with "doing things differently."

Repeated factor analyses (Kirton, 1987a) show that total adaptor-innovator scores are composed of three traits: a characteristic preference for, but not capacity, of (1) sufficiency (versus proliferation of originality); (2) (personal) efficiency; and (3) group-rule conformity. They are closely related, respectively, to the creative loner (Rogers, 1959) and to the typical bureaucrat and bureaucratic behavior (Merton, 1957; Weber, 1970).

The development of the A-I theory began with observations made and conclusions reached as a result of a study of management initiative (Kirton, 1961). The aim of this study was to investigate the ways in which ideas, which had led to radical changes in the companies studied, were developed and implemented. In each of the examples of initiative studied, the resulting changes had required the cooperation of many managers and others in more than one department.

Numerous examples of successful "corporate" initiative, such as the introduction of a new product or new accounting procedures, were examined, and this analysis highlighted the stages through which such initiative passed on the way to becoming part of the accepted routine of the company—i.e., perception of the problem, analysis of the

Table 2. *Reliabilities*

(A)

Sample	Internal reliability coefficient	N	Country	Author
General	Cronbach alpha = 0.88	562	UK	Kirton, 1976
Population	Cronbach alpha = 0.87	835	Italy	Prato Previde, 1984
	K-R20 = 0.86	214	USA	Goldsmith, 1985
Managers	K-R20 = 0.88	256	USA	Keller and Holland, 1978a
	Cronbach alpha = 0.89	203	UK	De Ciantis, 1987
	*Cronbach alpha = 0.91	142	UK	McCarthy, 1987
	Cronbach alpha = 0.90	221	USA	Keller, 1986
Students 1	Cronbach alpha = 0.85	123	USA	Ettlie and O'Keefe, 1982
2	Cronbach alpha = 0.84	106	USA	Goldsmith, 1984
2	Cronbach alpha = 0.86	98	USA	Goldsmith, 1986
2	Cronbach alpha = 0.83	138	USA	Goldsmith and Matherly, 1986a
2	Cronbach alpha = 0.87	123	USA	Goldsmith & Matherly, 1986b
3	Cronbach alpha = 0.86	412	New Zealand	Kirton, 1978b
4	Cronbach alpha = 0.76	374	Ireland	Hammond, 1986

*All women, other management samples wholly or predominantly men.
1 Graduates and undergraduates. 2 Undergraduates. 3 Students 17-18 years old.
4 Students 15-19 years old.

(B)

Sample	Time interval	Test-retest coefficient	N	Country	Author
Students (17-18 years old)	7 months	0.82	64	New Zealand	Kirton, 1978b
Managers	5-17 months	0.84	106	USA	Gryskiewicz et al., 1987
		Mean (1) (2)			
Students	4 months	91.2 91.1	121	So. Africa	Pottas (unpub.)

IMPLICATIONS	ADAPTORS	INNOVATORS
For Problem Solving	Tend to take the problem as defined and generate novel, creative ideas aimed at "doing things better." Immediate high efficiency is the keynote of high adaptors.	Tend to redefine generally agreed problems, breaking previously perceived restraints, generating solutions aimed at "doing things differently."
For Solutions	Adaptors generally generate a few well-chosen and relevant solutions that they generally find sufficient but which sometimes fail to contain ideas needed to break the existing pattern completely.	Innovators produce numerous ideas, many of which may not be either obvious or acceptable to others. Such a pool often contains ideas, if they can be identified, that may crack hitherto intractable problems.
For Policies	Prefer well-established, structured situations. Best at incorporating new data or events into existing structures or policies.	Prefer unstructured situations. Use new data as opportunities to set new structures or policies accepting the greater attendant risk.
For Organizational "Fit"	Essential to the ongoing functions, but in times of unexpected changes may have some difficulty moving out of their established role.	Essential in times of change or crisis, but may have some trouble applying themselves to ongoing organizational demands.
For Potential Creativity	The KAI is a measure of style but not level or capacity of creative problem solving. Adaptors and innovators are both capable of generating original, creative solutions, but which reflect their different overall approaches to problem solving.	
For Collaboration	Adaptors and innovators do not readily get on, especially if they are extreme scorers. Middle scorers have the disadvantage that they do not easily reach the heights of adaption or innovation as do extreme scorers. This, conversely, is a positive advantage in a team where they can more easily act as "bridgers," forming the consensus group and getting the best (if skillful) out of clashing extreme scorers.	
For Perceived Behavior	Seen by innovators as: sound, conforming, safe, predictable, relevant, inflexible, wedded to the system, intolerant of ambiguity.	Seen by adaptors as: unsound, impractical, risky, abrasive; often shocking their opposites and creating dissonance.

Figure 1. ***Characteristics of adaptors and innovators***

problem, analysis of the solution, agreement of change, acceptance of change, delegation, and finally implementation. The study also looked at what went wrong at these various stages and how the development of a particular initiative was thus affected. From this a number of anomalies were thrown up that at the time remained unexplained: delays in introducing change, objections to new ideas, and rejection of individuals.

Delays in Introducing Change. Despite the assertion of managers that they were collectively both sensitive to the need for changes and willing to embark on them, the time lag between the first public airing of most of the ideas studied and the date on which an idea was clearly accepted as a possible course of action was a matter of years—usually two or three. Conversely, a few were accepted almost immediately, with the bare minimum of in-depth analysis. (The size of proposed changes did not much affect this time-scale, although all the changes studied were large.)

Objections to New Ideas. All too often, the new idea had been formally blocked by a series of well-argued and reasoned objections which were upheld until some critical event—a "precipitating event"—occurred; then none of these contrary arguments (lack of need, lack of resource, etc.) was ever heard again. Indeed, it appeared at times as if management had been hit by almost total collective amnesia concerning past objections.

Rejection of Individuals. There was a marked tendency for the majority of ideas which encountered opposition and delays to have been put forward by managers who were themselves unacceptable to an "establishment" group—not just before but also after the ideas they advocated had not only become accepted but even rated as highly successful. At the same time other managers putting forward the more palatable ideas were themselves not only initially acceptable but remained so, even if these ideas were later rejected or failed.

The A-I theory now offers a rational, measured explanation of these findings.

Adaptors and Innovators: Two Different Styles of Thinking

Adaptive solutions are those that depend directly and obviously on generally agreed paradigms, are more easily grasped intellectually, and are therefore more readily accepted by most—by adaptors as well as by the many innovators not so directly involved in the resolution of the problem under scrutiny. The familiar assumptions on which the solution depends are not under attack and help "butter" the solution advanced, making it more palatable. Such derived ideas, being more

readily acceptable, favorably affect the status of their authors, often even when they fail—and the authors of such ideas are much more likely to be themselves adaptors, characterized as being personally more acceptable to the "establishment" with whom they share those underlying familiar assumptions (Kirton, 1976). Indeed, almost irrespective of their rank, they are likely to be part of that establishment, which in the past has led innovators to claim somewhat crudely that adaptors owe their success to agreeing with their bosses. However, Kirton (1977) conducted a study in which KAI scores were compared with a scale of Superior/Subordinate Identification (Chapman & Campbell, 1957) in a sample of 93 middle managers. No connection was found between KAI scores and tendency to agree with one's boss. Instead, a more subtle relationship is suggested—i.e., that those in the upper hierarchy are more likely to accept the same paradigms as their adaptor juniors and that there is, therefore, a greater chance of agreement between them on broad issues and on approved courses of action. Where they disagree on detail within the accepted paradigm, innovators may be inclined to attach less significance to this and view the broad agreements reached as simple conformity.

It can thus be seen how failure of ideas is less damaging to the adaptor than to the innovator, since any erroneous assumptions upon which the adaptor's ideas were based were also shared with colleagues and other influential people. The consequence is that such failure is more likely to be written off as "bad luck" or due to "unforeseeable events," thereby directing the blame away from the individuals concerned.

In stark contrast to this, innovative ideas—not being as closely related to the group's prevailing, relevant paradigms, and even opposing such consensus views—are more strongly resisted, and their originators are liable to be treated with suspicion and even derision. This rejection of individuals tends to persist even after their ideas are adopted and acknowledged as successful. (It should be noted that both these and the descriptions below are put in a rather extreme form—as a heuristic device—and therefore usually occur in a somewhat less dramatic form.)

Differences in Behavior

Evidence is now accumulating from a number of studies (Beene, Helton, Zelhart, & Markley, 1985; Carne & Kirton, 1982; Ettlie & O'Keefe, 1982; Kirton, 1976, 1978a, 1987b; Kirton & De Ciantis, 1986; Kirton & Hammond, 1980; Goldsmith, 1984, 1986a, 1986b, 1986c; Goldsmith & Matherly, 1986a, 1986b; Goldsmith, Matherly, &

Wheatley, 1986; Gryskiewicz, 1982; Prato Previde, 1984; Prato Previde & Carli, 1987) that personality is implicated in these characteristic differences between adaptors and innovators. (Also related is a recently tested measure of learning style [De Ciantis, 1987]; the same study shows management styles, however, are unrelated.) Indeed, personality must be involved, since the way in which one thinks affects the way in which one behaves, and is seen to behave, in much the same way as there are differences in personality characteristics between those who are left-brain-dominated and those who are right-brain-dominated—the former described as giving rise to methodical, planned thinking and the latter to more intuitive thinking (Torrance, 1982). (There is a significant correlation between left-right-brain preference scores and adaption-innovation—see Table 1, p. 46.) The personality characteristics of adaptors and innovators that are part of their cognitive style are described here.

Innovators are generally seen by adaptors as being abrasive and insensitive, despite the former's denial of these traits. This misunderstanding usually occurs because the innovator attacks the adaptor's theories and assumptions—both explicitly, when he feels that the adaptor needs a push to hurry him in the right direction or to get him out of his rut, and implicitly, by showing a disregard for such things as rules, conventions, and standards of behavior. Irritations can occur in seemingly minor ways, such as the innovator's marked preference to produce a plethora of ideas when "a couple of good ones would do for

OR, WE COULD RUN EVERYTHING BACKWARDS, AND...
LOOK. WE ALREADY HAVE FIVE GOOD IDEAS. WHY DO WE NEED FIFTY HAREBRAIN, IMPOSSIBLE IDEAS?

now." What is even more upsetting for the adaptor is the fact that on many an occasion the innovator does not even seem to be aware of the havoc he or she is causing. Innovators may also appear abrasive to each other, since neither will show much respect for the other's theories, unless of course their two points of view happen temporarily to coincide. Adaptors can also be viewed pejoratively by innovators, suggesting that the more extreme types are far more likely to disagree than collaborate. Innovators tend to see adaptors as stuffy and unenterprising, wedded to systems, rules, and norms which, however useful, are restricting. The adaptors' preference towards producing "one or two good, relevant, obviously useful ideas" makes them look pedestrian in the eyes of innovators. So innovators often seem to overlook how much of the smooth running of all around them depends on good adaptiveness (Merton, 1957; Weber, 1970) but are acutely aware of the less acceptable face of efficient bureaucracy. Disregard of convention when in pursuit of their own ideas has the effect of isolating innovators in a similar way to Rogers' (1959) creative loner.

Although innovators find it difficult to work with others, adaptors find it easier. The latter will more rapidly establish common ground, assumptions, guidelines, and accepted practices on which to found their collaboration. Innovators also have to do these things in order to fit at all into a company, but they are less good at doing so, less concerned with finding out the anomalies within a system, and less likely to stick to the patterns they help form. This is at once the innovator's weakness and source of potential advantage.

Where are the Innovators and the Adaptors?

As already noted, much research has been devoted to a detailed personality description of these two cognitive styles. More recently attention has been focused on the issue of how they are distributed and whether any distinctive patterns emerge. It has been found from a large number of studies that KAI scores are by no means haphazardly distributed. Individuals' scores are derived from a 32-item inventory, giving a theoretical range of 32-160, and mean of 96. The observed range is slightly more restricted, 46-146, based on over 1,000 subjects. (General population samples are in the U.K.; 2,000 more subjects in Italy and U.S.A. are all in close accord.) The observed mean is near to 95, and the distribution conforms almost exactly to a normal curve. The studies have also shown that variations by identifiable subjects are predictable, their mean shifting from the population mean in accordance with the theory. However, the groups' range of scores is rarely restricted—even smallish groups showing ranges of approxi-

mately 70-120—a finding with important implications for change, against the background of differences found at cultural level, at organizational level, between jobs, between departments, and between individuals within departments. This is a somewhat arbitrary grouping since norms of cognitive style can be detected wherever a group of people define themselves as different or distinct from others, by whatever criteria they choose, be it type of work, religion, philosophy, etc. However, while allowing for a certain amount of overlap, the majority of research studies can be classified according to these groupings.

Innovators and Adaptors in Different Cultures

A considerable amount of research information has been accumulating about the extent to which mean scores of different samples shift from culture to culture. The three principal works based on large general population samples (Goldsmith, 1985; Kirton, 1976; Prato Previde, 1984) have produced means within a single point of one another (approximately 95) and very similar standard deviations. Other published normative samples collected in Britain (Kirton, 1980), U.S.A. (Ettlie & O'Keefe, 1982; Gryskiewicz, Hills, Holt, & Hills, 1987; Keller & Holland, 1978a), Canada (Kirton, 1980), and New Zealand (Kirton, 1978b) have all produced remarkably similar means. When the KAI was validated on a sample of Eastern managers from Singapore and Malaysia (Thomson, 1980) their mean score of 95 (s.d. 12.6; N = 145) was compatible with those of their Western counterparts—e.g., the mostly male managerial sample from the U.K. had a mean of 97 (s.d. 16.9; N = 88) compared to male norms in general U.K. samples of 98 (s.d. 17; N = 290).

However, samples of Indian and Iranian managers (Hossaini, 1981; Khaneja, 1982) yielded more adaptive means: approximately 91, with N = 622. Exactly similar adaptive norms were also found in work still in progress on a sample of black South African business students (Pottas, unpublished). Clearly there may be cultural differences in adaptor-innovator norms, but the possibility of select sampling cannot yet be ruled out. There is already evidence accumulating for a further speculation put forward by Kirton (1978c, 1980; also Kirton & Pender, 1982) that people who are most willing to cross boundaries of any sort are likely to be more innovative, and the more boundaries there are and the more rigidly they are held, the higher the innovative score should be of those who cross. In the Thomson (1980) study, managers in Western-owned companies in Singapore scored higher in innovativeness than either those working for private local companies or those in the civil service; those in this last category had the most

adaptive scores of the triad. Work on Indian managers (Dewan, 1982) found that, as expected, entrepreneurs scored higher on the KAI than non-entrepreneurs (97.9 and 90.5 as opposed to 77.2 for government officers), but Indian women entrepreneurial managers were found to be even more innovative than their male counterparts. They had to cross two boundaries: They broke with tradition by becoming a manager in the first place, and they had succeeded in becoming a manager in a risky entrepreneurial business. (Women generally have means about 1/2 s.d. more adaptive than men.) A similar phenomenon has been found in Britain, the gap between women personnel managers and male counterparts being the same as that for women and men in the general population. Women engineering managers, however, are significantly more innovative than women generally, and men generally, as well as male engineering managers. The interpretation of these results (McCarthy, 1987) is that British culture now accepts women managers in the personnel field, whereas women engineers are still paradigm-cracking rarities.

Innovators and Adaptors in Different Organizations

Organizations in general (Mulkay, 1972; Whyte, 1957), and especially organizations which are large in size and budget (Swarez, 1970; Veblen, 1928), have a tendency to encourage bureaucracy and adaptation in order to minimize risk. It has been said by Weber (1970), Merton (1957), and Parsons (1951) that the aims of bureaucratic structure are precision, reliability, and efficiency and that the bureaucratic structure exerts constant pressure on officials to be methodical, prudent, and disciplined and to attain an unusual degree of conformity. These are the qualities that the adaptor-innovation theory attributes to the "adaptor" personality. For the marked adaptor, the longer an institutional practice has existed, the more he or she feels it can be taken for granted. So when confronted by the problem, such a person does not see it as a stimulus to question or change the structure in which the problem is embedded but seeks a solution within that structure, in ways already tried and understood—ways which are safe, sure, and predictable. This person can be relied upon to carry out a thorough, disciplined search for ways to eliminate problems by "doing things better" with a minimum of risk and a maximum of continuity and stability. This behavior contrasts strongly with that of the marked innovator. The latter's solution, because it is less understood and its assumptions untested, appears more risky and less sound and it involves more "ripple-effect" changes in areas less obviously needing to be affected; in short, it brings about changes with

outcomes that cannot be precisely envisioned. This diminution of predictive certainty is unsettling and not to be undertaken lightly, if at all, by most people—but particularly by adaptors, who feel not only more loyal to consensus policy but less willing to jeopardize the integrity of the system (or even the institution). The innovator, as compared to the adaptor, is liable to be less respectful to the views of others, more abrasive in the presentation of his solution, more at home in a turbulent environment, apparently less relevant in his thinking about company needs (since his or her perceptions may differ as to what is needed), and less concerned with people in the pursuit of his or her goals. Tolerance of the innovator is lowest when adaptors feel under pressure from the need for imminent radical change. Yet the very disadvantages of innovators are as necessary to institutions as the virtues of adaptors.

Every organization has its own particular "cognitive climate," and at any given time most of its key individuals reflect the particular mode—say that exhibited by those 1 s.d. on either side of the group mean (1/2 s.d. = 8-9 points, an amount large enough to be "visible" [Kirton & McCarthy, 1985]). Sufficient evidence has been collected to enable predictions to be made about the direction of these shifts in KAI mean, and about the extent to which these shifts will occur from organization to organization. For example, it has been suggested by Kirton (1980) that the mean scores of managers who work in a particularly stable environment will incline more towards adaption, while the mean scores of those whose environment could be described as turbulent will tend towards innovation. This hypothesis was supported by a number of studies, including those of Dewan (1982) and Khanaja (1982), which have already been noted. Thomson (1980), whose study has also already been noted, showed that a Singapore sample of middle-ranking civil servants was markedly adaptor-inclined (mean = 89, s.d. 10.5), whereas the means of a sample of managers in multinational companies were just as markedly innovator-inclined (mean = 107, s.d. 11.4). Both Gryskiewicz et al. (1987) and Holland (1987) suggest that bank employees are inclined to be adaptors; so are local government employees (Hayward & Everett, 1983) and accountants (Gul, 1986). Employees of R&D-oriented companies, however, show the opposite inclination (Keller & Holland, 1978b; Lowe & Taylor, 1986). Two of these studies support and refine the hypothesis that, given time, the mean KAI score of a group will reflect its ethos. Both studies found that groups of new recruits had means away from those of the established group they were joining; however, within three (Holland) or at most five (Hayward & Everett) years, as a result of staff changes, the gaps between the means of the

new groups and the established groups narrowed sharply. New work by Holland, Bowskill, and Bailey (1991) is providing further support.

If there are predictable variations between companies, wherever selection has been allowed to operate for a sufficient length of time, then variations may be expected within a company as adaptors and innovators are placed in the part of the organization which suits them best. It is unlikely (as well as undesirable) that any organization be so monolithic in its structure and in the "demands" on its personnel that it produces a total conformity of personality profiles. This hypothesis was tested and supported by Kirton (1980), who found that adaptors tended to be more at home in departments of a company that must concentrate on solving problems that emanate primarily from within their departmental system (e.g., production) and that innovators tended to be more numerous in departments that act as interfaces (e.g., sales, progress chasing). Studies by Keller and Holland (1978b) in American R&D departments found that adaptors and innovators had different roles in internal company communications: Adaptors were more valued for communications on the workings of the company, and innovators were more valued for communications on advanced technological information. Kirton (1980) also found that managers who tended to select themselves to go on courses had significantly different mean KAI scores from the managers who were sent on courses as part of the general scheme; the former, self-selected, managers were innovator-inclined, whereas the latter, personally unselected, managers were not. Members of three groups of courses were tested: one British "unselected," one British "selected," and one Canadian "selected." The results showed that the unselected managers scored significantly more adaptively than the selected groups. Among the Canadian sample of managers there was sufficient information on their job titles to be able to divide them into two groups of occupations: those liable to be found in adaptor-oriented departments (e.g., line manager) and those liable to be found in innovator-oriented departments (e.g., personnel consultant). The latter group was found to be significantly more innovative than the former, having a mean of 116.4 for nonline managers as opposed to a mean of 100.14 for line managers. (Because of the nature of this course and selection system, both groups' means were displaced towards innovativeness; however, they retain their distance vis-à-vis each other.) These findings later led to a full-scale study (Kirton & Pender, 1982) in which data on 2,375 subjects collected in 15 independent studies were cross-tabulated with reference to different occupational types and varying degrees of selection to course. Engineering instructors and apprentices were studied as examples of occupations involving a narrow range of

paradigms, thorough rigid training, and a closely structured environment, while research and development personnel were examined as examples of occupations involving a number of flexible paradigms and a relatively unstructured environment. The differences were large, significant, and in the expected direction.

These variations which exist between companies and between occupational groups are also found within the relatively narrow boundaries of the job itself. For example, work in progress suggests that within a job there may be clear subsets whose tasks differ and whose cognitive styles differ—e.g., an examination of the job of quality-control workers for a local-government body revealed that the job contained two major aspects. One was the vital task of monitoring, and the other was the task of solving anomalies which were thrown up in the system from time to time. The first of these tasks was carried out by an adaptively-inclined group, and the second by an innovative one. Gryskiewicz et al. (1987) have found that subsets of bank managers whose tasks made them interfaces between the bank and its clients had significantly more innovative means (110 s.d. 15) compared with their U.S. norm group (91 s.d. 14) and Holland's U.K. norm group (91 s.d. 17).

Foxall (1986) has found similar subsets in a number of groups, separating cost accountants, technical managers, and administrative general managers from financial accountants, managing engineers, and directive general managers. Gul (1986) found marked relationships between preferences for subspecialisms in accounting and adaption-innovation scores. Such knowledge about jobs and who is inclined to do them could eventually lead to better integration of adaptors and innovators within a company, and it is a precursor to an examination of the role of cognitive style in organizational climate (Clapp & De Ciantis, 1987; Kirton & McCarthy, 1988).

Buying New Ideas and Products

Recent research has explored the relevance of adaptive-innovative cognitive styles to the adoption of new ideas and products. Mudd and McGrath (1985) investigated the adoption of teaching innovations. They found an encouraging relationship between adaption-innovation and the number of innovations adopted, although significant relationships were not found for the adoption of any particular new teaching device or method. Presumably too many other general and unique factors also intervened. Path-breaking work on the adoption of consumer innovations was at the same time being undertaken by Foxall (1988), who has since made important contributions to both

empirical knowledge and the theoretical framework for the analysis of consumer innovativeness.

Although there are well-established reasons for believing that consumer innovators (i.e., the first buyers of new products) differ in personality terms from later adopters, the empirical evidence for such a relationship is extremely tenuous (note again Mudd and McGrath's finding for single ideas). Although hundreds of investigations have been undertaken, the correlations they have produced have been so low as to be "questionable or even meaningless" (Kassarjian & Sheffet, 1982). Foxall argues that this is because researchers have chosen an inappropriate level of analysis, have insensitively used tests validated in areas other than consumer behavior, and have not considered the degree of continuity (similarity) or discontinuity (radical difference) represented by different innovative brands and products.

His research indicates that consumers who buy discontinuously innovative brands and products are more innovative (in KAI terms) than purchasers of continuous items. However, purchasers of the largest number of new brands and products tend to be adaptive. This finding suggests, in line with KAI theory, that committed purchasers of a given brand or product class tend to be assiduous seekers-out of some particular class of novelty. The characteristic of assiduous (systematic) activity probably related to a paradigm (e.g., healthy eating) is more likely to be found in adaptors than innovators. The research which has been published (Foxall, 1988; Foxall & Haskins, 1986, 1987) suggests that models of consumer innovativeness which have recently appeared in the marketing literature (Hirschman, 1980; Midgley & Dowling, 1975) be modified to take full account of adaptive and innovative cognitive styles. Such a conclusion, when added to the pilot work of Mudd and McGrath, implies that a theoretical structure can be formalized that is wider and more general than that contained in any of the three individual studies by Foxall and Haskins; Foxall and Haskins have noted this themselves.

Who Are the Agents for Change?

It has already been noted that the mean adaptor-innovator score of a group may shift quite considerably depending on the population in question, even while the range remains relatively stable. This suggests that a person may at times be part of a group whose mean adaptor-innovator score is markedly different from his or her own. There are three possible reasons why one would be caught up in this potentially stressful situation: He or she is (a) in transit, for example, under training schemes; (b) trapped, unhappy, and may soon leave

(Hayward & Everitt, 1983; Lindsay, 1985); or has (c) found a suitable niche and has developed a particular role identity. (These three categories should be regarded as fluid, since given a change in the individual's peer group, boss, department, or even organizational outlook, he or she may well shift from one category to another.)

It is the third category which will most repay further investigation because it involves refinements of the A-I theory which have considerable practical implications, though these are as yet speculations and work is currently being undertaken to explore their ramifications more fully.

The individual who can successfully accept and be accepted into an environment alien to his or her own cognitive style must have particular survival characteristics; it is those characteristics which make one a potential agent for change within a particular group. In order to effect a change an individual must, first, have job know-how (also an important quality in functioning as a valuable group member when major changes are not needed) and, second, be able to gain the respect of colleagues and superiors. With the latter comes commensurate status, which is essential if his or her ideas are to be recognized. Lastly, a person embarked on a course of action for change will of course require the general capacity—e.g., leadership, management qualities—to carry out such a task. A different cognitive style gives one a powerful advantage over colleagues in being able to anticipate events which others may not see (because they may not think to look in that direction).

Therefore, the agent for change can be seen as a competent individual who has enough skill to be successful in a particular environment (by virtue of having selected, or having been selected for, tasks within the unit that were less alien to his cognitive style). At this point such a person plays a supportive role to the main thrust of the group with its contrasting cognitive style. Given a "precipitating event," however (particularly if it was anticipated and prepared for), he or she becomes at once a potential leader in a new situation. In order to be able to take advantage of this position, one must have personal qualities to bring to bear; management must have the insight to recognize the position, and management development must have also played its part. However, this may need to be reinforced by individual and group discussion or even counselling (e.g., Lindsay, 1985) which makes use of an understanding of adaption-innovation theory.

It should be emphasized here that the change agent can be either an adaptor or an innovator, and this is solely determined by the group composition. If it is an innovator group, the change agent will be an adaptor, and vice versa. This discovery challenges traditional assumptions that heralding and initiating change is the innovator's preroga-

tive; a precipitating event could demand either an adaptive or innovative solution, depending on the original orientation of the group and the work. An example in which an adaptor is the change agent in a team of innovators might be where the precipitating event takes the form of a bank's refusal to give further financial support to a new business enterprise. At this stage the change agent (who may have been anticipating this event for months) is at hand with the facts, figures, and a cost-cutting contingency plan all neatly worked out. It is now that the personal qualities of know-how, respect, status, and ability are crucial for success. All this assumes that many groups will have means away from the center. It seems likely that the more the mean is displaced in either direction, the harder it will be, the bigger the precipitating event needs to be, to pull the group back to the middle, which may be unfortunate both for the group and the change agent. However, an "unbalanced" team is what may be required at any particular time. To hold such a position and yet to be capable of flexibility is a key management task.

Conclusion

On the individual level, a better understanding of the contribution to problem solving that each person makes, each in his or her own characteristic way, is the basis of more mutual tolerance, especially in times of stress. This, in turn, may lead to better collaboration, which may well be reinforced by greater success. The training needed to hasten the acquisition and the reinforcing of such insights are the work of particular people and departments supported by significant leaders. Much experience is developing at the Center for Creative Leadership (Gryskiewicz et al., 1987) and elsewhere (see McHale & Flegg, 1985, 1986) on ways of putting these insights across and in seeing them in operation. Training is helped by the knowledge (Kirton & McCarthy, 1985) that people can readily be brought to give good estimates of their own and others' relative positions on the KAI continuum. Widely heterogeneous groups are intrinsically more difficult to manage than homogeneous ones; wide differences in cognitive style between women managers and their (often) male colleagues lead to more reported stress (McCarthy, 1987). Some heterogeneous groups may manage well enough over long periods, however (Clapp & De Ciantis, 1987), and education has a role to play in promoting reasonable harmony in the presence of useful diversity. In a wider context, it is hoped that adaption-innovation theory will offer an insight into the interactions among the individual, the organization, and widespread change. By using the theory as an additional informational resource

when forward planning, one may also anticipate and retain control of changes brought about by extraneous factors. Thoughts are being pursued (van der Molen, 1985) which may throw light on how such changes might take place amid less imbalance and confusion, thereby rendering them more effective.

Note

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Michael John Kirton has developed a theory that has had great impact on the field of creativity and innovation in general, and on my work in particular. I first encountered his ideas while I was a Ph.D. student at the University of London. My classes started in October 1976, the same month that Kirton's adaption-innovation thesis appeared in the Journal of Applied Psychology. *This was the first major publication of his scholarly work, and it provided for me a framework to reconceptualize the construct of creativity. Until that time, creativity had been a simplistic construct for me: People differed solely in terms of "how much" creative ability they possessed. Kirton added the dimension of* style *of creativity, which made possible a contingency framework for creativity: one that I would come to develop as "workable creativity."*

Style measures had been particularly useful to me in my early work as an assessor and developer of creative leaders. Kirton's construct has provided a previously missing piece when I talk with managers about creativity. Over the sixteen years we have known each other, we have continued to both stimulate and drive each other toward additional applications and research. The impact of the KAI concept is now worldwide, and I believe its effect will continue to be felt.

Kirton was born in Malta. Many of our personal conversations revolve around his experience as a pilot in Europe during World War II. Kirton is also an archeologist who has become involved in a major pre-Norman dig and reclamation in his own village of Berkhamsted, England. One of my more pleasant memories is an English summer day's walking tour of St. Alban's Cathedral with a walking history book—Michael.

Michael has been Director of the Occupational Research Centre at Hatfield Polytechnic for years, and he has devoted much time to building theories and writing about vocational development. Most recently
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he was awarded a Doctorate of Science degree by his professional peers and colleagues in the British Psychological Society. He has taken the Occupational Research Centre to Berkhamsted, where he is continuing the development of the KAI. **SSG.**

Climate for Creativity: What to Measure? What to Say About It?

Nancy Koester and Robert M. Burnside

The Work Environment Inventory (WEI) developed by Teresa Amabile in collaboration with the Center for Creative Leadership assesses work environment factors that stimulate and hinder creativity. This paper describes the most recent WEI research and presents a model to guide future research and data feedback.

Purpose

This study statistically examined the WEI based on a sample of 14 companies with 1,863 respondents. Previous WEI studies used much smaller samples. The current sample size allowed a more rigorous assessment of the instrument. This study addressed two questions: What does the factor structure look like and is it reliable? Can the number of items be reduced without affecting instrument reliability?

Method

Subjects

The respondents represent all professional levels and all functional groups (i.e., marketing, manufacturing, R&D, etc.) in 14 companies that had either volunteered to participate in the research or had requested the survey for feedback. All employees participated voluntarily and were assured anonymity. Table 1 (p. 70) contains a pseudonym list of the companies, the number of respondents, and the functional groups. The sample from each company varies; some are a representative sample from the whole organization, whereas others are a targeted group such as middle management. Overall the sample is primarily composed of middle management.

Table 1. ***Sample Description***

Company	N	Functional groups represented
Chemical Inc.	254	Research and engineering only
Government Research Lab	68	Research and development only
Midwest	96	A group of entrepreneurs
Nonprofit Educational Institution	127	All functions
Textiles Inc.	100	All functions
Med Tech Inc.	29	All functions
Big Bank Inc.	38	Upper management only
Educational Publications Inc.	43	All functions
Consumer Products Inc.	428	All functions
Government Research Contractor	200	All functions
Fiber Inc.	188	R&D functions only
Steel Inc.	72	Upper management only
Specialty Mfg.	80	Middle management
Oil Inc.	140	All functions of an exploration division
	1,863	

Prior Instrument Development

The WEI has been under development since 1984; for a detailed description see Amabile and Gryskiewicz (1989). Survey items for the WEI were derived from interviews with 203 Research and Development (R&D) scientists (Amabile & Gryskiewicz, 1987) who were asked to tell two stories: (1) about an event that was high in creativity; and (2) about an event that was low in creativity. Content analysis of the interviews revealed four themes: environmental stimulants to creativity, environmental obstacles to creativity, positive personal characteristics, and negative personal characteristics. Two-thirds of the comments focused on environmental characteristics and one-third were about personal characteristics. The WEI focuses on the environmental characteristics. Originally, nine stimulants and nine obstacles to creativity in the work environment were identified. Survey items were derived directly from the interviews, with three to eleven items per scale. Traditional test development methods yielded eight stimulants and four obstacles based on 101 items. Two scales were developed to rate the organization's creativity and productivity.

Items were both positively and negatively worded to minimize response bias. In addition, items are worded with reference to a par-

ticular part of the organization, using phrases such as "this organization," "my supervisor," "my work group," or "my area of this organization."

The response format for all items was a four-point Likert-type scale: 1 = never or almost never true of your current work environment; 2 = sometimes true of your current work environment; 3 = often true of your current work environment; 4 = always or almost always true of your current work environment.

Analysis

The 101 items were factor-analyzed and then subjected to item reduction.

In phase one the factor structure was rigorously assessed. First, a principal-axis factor analysis with varimax rotation was conducted. All factors with an eigenvalue greater than one were retained. Nine factors emerged; however, no item had a primary loading on the ninth factor. Thus eight factors were retained for further analyses. To assess the rigorousness of these factors a series of analyses were performed including principal axis with varimax rotation on subgroups of the sample, oblique rotation, and regression analysis. Regression analysis was conducted to verify the factor structure across subgroups of the sample.

In phase two the Regression Brown formula was used to determine the number of items that could be deleted while maintaining a reliability of at least .80. For each scale, items were rank ordered by item-total correlation. Items with the highest item-total correlation were retained for the final version.

Results

Results revealed similar factor structures across subgroups of the sample. The oblique and orthogonal rotations were similar; therefore the more interpretable orthogonal solution was used. Regression analysis yielded support for the factor structure across subgroups of the sample. The eight factors identified are listed in Table 2 (p. 72) along with scale reliabilities.

Table 2. *WEI Scale Reliabilities*

Scale Name	Number Items	Reliability
Organizational Encouragement	15	.92
Supervisory Encouragement	11	.92
Work Group Supports	8	.86
Challenging Work	5	.80
Workload Pressure	5	.77
Freedom	4	.69
Organizational Impediments	12	.84
Sufficient Resources	6	.82

Scale descriptions and sample items are presented in Appendix A.

Discussion

There has been an ongoing debate in the climate literature suggesting the need for a distinction between organizational climate and psychological climate (James & Jones, 1974; Joyce & Slocum, 1979; Payne, Fineman, & Wall, 1976). The argument essentially focuses on levels of analysis, stating that they should not be confused. Organizational climate is viewed as an objective feature of the organization that can be measured by the aggregate perceptions of members of the organization. Psychological climate on the other hand is an individual-level attribute; it is the subjective interpretation made by each individual. It is not appropriate to aggregate these perceptions and refer to this as an organizational attribute. In addition, it has been widely accepted that there may be subcultures within a climate; this is often referred to as subunit, work group, etc. We propose that creativity is influenced by all three climates; therefore when measuring climate for creativity in organizations we need to distinguish between the organizational climate for creativity, the subunit climates, and the psychological climate. All can potentially impact an organization's creativity. Thus when trying to help an organization become more creative it's important to assess all three types of climate in order to identify strengths and weaknesses. In addition, we propose that the factors at each level may be different.

Appendix B contains a brief summary of factors commonly used when measuring climate for creativity. The question is, "How do these

factors influence creativity?" Figure 1 suggests one way of looking at this interrelationship. As shown by the three circles, all three climates overlap and influence each other and all overlap and influence creativity. When developing measures to assess the climate for creativity it is important to specify the level to which you are referring. For instance, items referring to the organizational level should specify the organization in general and distinguish that from an employees work group or division (Glick, 1985). Items measuring the psychological climate in this manner should not be aggregated as a measure of organizational climate unless consensual agreement is shown (Ashforth, 1985; Joyce & Slocum, 1982; Joyce & Slocum, 1984; Schneider & Reichers, 1983). The primary difference between the three levels of climate is in the wording of the item. For example, to measure rewards at each level respondents would rate each level separately as shown in the example below:

Organization level:
People in this organization are rewarded for creative ideas.

Group level:
People in my work group are rewarded for creative ideas.

Individual level:
I am (have been) rewarded for creative ideas.

If the survey identifies a problem such as lack of rewards and recognition at the individual level, then the approach to solve it is to make employees aware of the actual availability of rewards and recognition and provide training in creativity skills and development. If

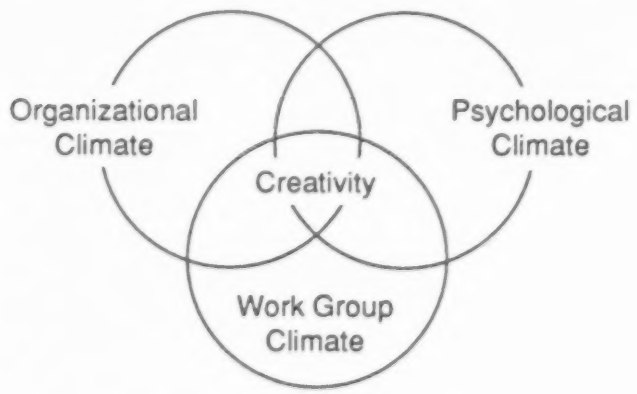

Figure 1. ***The relationship between climate and creativity***

instead the survey showed that rewards and recognition were lacking at the organizational level, then systems and processes for rewarding creativity would need to be established.

In summary, results of the factor analysis revealed that respondents categorized their responses on the basis of level of reference in the organization. The problems associated with level of analysis have been widely discussed in the climate literature. The approach suggested above addresses these issues and provides a basis for practical feedback to organizations.

Note

This paper was presented at the Second International Creativity Symposium in Noordwijk, The Netherlands, December 11, 1989. It has also appeared in *Creativity and Innovation: Learning From Practice* (Delft, The Netherlands: Innovation Consulting Group TNO, 1991), edited by T. Rickards, P. Colemont, P. Grøholt, M. Parker, and H. Smeekes, pages 55-61. It is reprinted with permission.

Appendix A: Scale Descriptions and Example Items

Organizational encouragement: encouragement and support for creativity in the organization. There is an open atmosphere where new ideas are encouraged and judged fairly and people are recognized for creative work and encouraged to take risks and solve problems creatively. Example items: "People are encouraged to solve problems creatively in this organization." "New ideas are encouraged in this organization."

Supervisory encouragement: a manager who gives support to subordinates, communicates effectively, and sets clear goals. Example items: "My supervisor values individual contributions to projects." "My supervisor clearly sets overall goals for me."

Work-group supports: teamwork, willingness to help each other, commitment to the work, and trust with fellow workers. Example items: "There is a feeling of trust among the people I work with most closely." "Within my work group, we challenge each other's ideas in a constructive way."

Challenging work: challenge due to the importance of the work and the intriguing nature of the task. Example items: "I feel challenged by the work I am currently doing." "I feel that I am working on important projects."

Workload pressure: unrealistic expectations for what people can achieve in this organization, too many distractions from project work, insufficient time to do projects. Example items: "There are unrealistic expectations

for what people can achieve in this organization." "There are too many distractions from project work in this organization."

Freedom: freedom in deciding how to accomplish the task, a sense of control over one's work and ideas. Example items: "I have the freedom to decide how I am going to carry out my projects." "In my daily work environment I feel a sense of control over my own work and my own ideas."

Organizational impediments: organizational obstacles to creativity such as destructive criticism, turfism, political problems, and unfair evaluation. Example items: "Destructive criticism is a problem in this organization." "People in this organization are very concerned about protecting their territory."

Sufficient resources: access to appropriate resources, including facilities, equipment, information, funds and people. Example items: "Generally I can get the resources I need for my work." "The information I need for my work is easily obtainable."

Appendix B: Summary of Climate for Creativity Measures

Creative Climate in the Work Group
VanGundy (1984a, 1984b)
- External environment
- People motivators
- Individual creativity
- Interpersonal relationships

Creative Organizational Climate
Ekvall (1983)
- Challenge
- Support for ideas
- Trust
- Freedom in the organization
- Freedom in the job
- Dynamism
- Tension

Siegel & Kaemmerer (1978)
- Support of creativity
- Tolerance of differences
- Personal commitment

The Creativity Audit
Richards & Bessant (1980)
- Track record
- Managerial attitudes to the marketplace
- Managerial attitudes towards ideas and creativity
- Organizational structure
- Management style
- Communications
- Human resources
- Reward systems
- Planning and control systems
- General environment

Pinchot & Company (1985)
- Fundamental innovation factors
- Freedom factors

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When Nancy Koester was asked if she wanted to revise any part of this piece, she asked, "Why do you want to reprint it?" To her, this report was one checkpoint on a long and grueling marathon to construct and validate a psychological survey. But she agreed to check it for necessary updating. To her surprise, she found the article still true. "We have done more work on the WEI but found nothing which contradicts this information," she reported.

Once a maker of jewelry in the mountains, then an IBM junior executive, and finally a research scientist and trainer at the Center—as well as surfer, skier, and top-level volleyball player—Nancy will shortly receive her Ph.D. in industrial psychology from North Carolina State University. Her dissertation research focuses on the WEI as an instrument: its potential and its legitimate uses.

For information on Robert Burnside, see the note at the end of his article in this volume (p. 243). ***SSG.***
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Innovation Through Investment in People: The Consideration of Creative Styles

Robert Rosenfeld

> The formation of a problem is often more important than its solution, which may be merely a matter of mathematical or experimental skill. To raise new questions, new possibilities, to regard old problems from a new angle, requires imagination and marks real advance in science. (Einstein & Infeld, 1938)

Progressive companies are generally interested in increasing the number of "good" ideas coming from their staff. This has traditionally been done by training individuals in idea-generation methods rather than by providing direct support for those individuals who have demonstrated a capability of generating ideas. The assumption has been that with an increase in the number of ideas generated, a concomitant increase in "good" ideas would result. Thus, companies have placed their emphasis on idea generation, and problem-solving sessions have most frequently been conducted with managers and those professionals who interface well with management. This is a natural tendency, as people tend to affiliate with those individuals who are similar to themselves in outlook and orientation. However, this may not be the best approach. An alternative might be to target those individuals who are creative and nurture their development. Instruments such as the Kirton Adaption-Innovation Inventory (KAI) may offer assistance in this endeavor (see Kirton, 1976, 1989; see also Kirton's article, "Adaptors and Innovators: Problem-solvers in Organizations," in the present volume).

The KAI was designed to measure a person's creative style. The instrument does not measure one's intellect or creative capacity but one's creative style. Creative capacity and potential are most commonly measured in terms of one's past performance. "Creative style," on the other hand, is defined as the manner in which a person interacts with his or her environment when solving problems. Kirton's model for creative style places people on a continuum between "adaption" and "innovation."

Adaptively creative people "operate cognitively within the confines of the pattern in which a problem is initially perceived. Their

creativity is less likely to challenge existing frameworks" (Gryskiewicz, 1982). By contrast, innovatively creative people approach problems in a different fashion. These individuals are "more likely to treat patterns as part of the problem. The problem is redefined and results in a creativity style that goes outside of the original problem definition" (Gryskiewicz, 1982). These two styles are visually illustrated in Figure 1. The box symbolizes an original problem or the confines of a company. An innovatively creative individual is predisposed to look for solutions to problems or new directions for his company predominantly outside the confines of the box, whereas an adaptively creative individual will generally create within the confines of the box. Both individuals are creative. The Inventory describes one's predisposition to a style of problem solving.

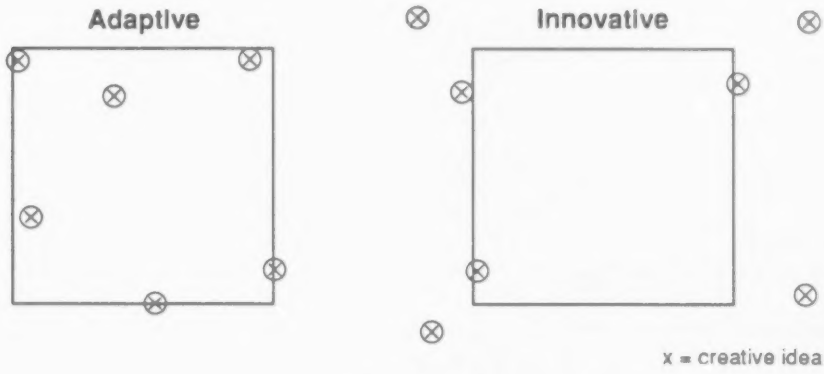


Figure 1. ***Creative styles***

In other studies and workshops conducted by Kirton (1981), people have discussed the implications of their style in the workplace. For example, individuals with scores high on the innovative end of the continuum expressed the following views. They felt that: (1) They didn't fit in; (2) they had their own personal agenda which may not appear relevant to the organization; (3) they had a low tolerance for adaptors; (4) it was hard to get positive recognition in big organizations; (5) ideas were stolen by bosses; (6) they needed a translator so others could understand them; (7) they hated to write; (8) they found it hard to get along with people above; and (9) they lost interest in working on a project once the end is seen.

Kirton (1977) also examined the view of adaptively creative individuals towards the innovatively creative individuals and the

reverse. Adaptors perceived innovators as being neurotic, extraverted, extrapunitive, and inner-directed, whereas innovators perceived adaptors as being stodgy, timid, or compliant.

Both the innovatively creative and the adaptively creative individuals serve important functions. It would be wrong to assume that only innovatively creative individuals should be valued. Both groups have specific and necessary functions in large corporations.

The work summarized above led us at the Research Laboratories of Eastman Kodak Company to hypothesize that those individuals who submit idea memorandums (IMs)[1] to the Photographic Divisions' Office of Innovation[2] would have an innovatively creative style, as measured by the Kirton Inventory. It was also hypothesized that the styles of submitters and their management would differ, with management being more adaptive given the nature of their role within the organization. We decided to examine the validity of these hypotheses.

Method

Letters were sent to all individuals (professionals, technicians, and managers) who had submitted IMs prior to and including 1981. Accompanying the letter was a copy of the KAI and a request that individuals complete and return it to the Office of Innovation. In exchange for completing the inventory, their scores were returned to them with a complete explanation. For purposes of this study, managers were defined as individuals who supervised five or more professionals within the selected divisions. Also included were managers who had not submitted IMs. Four groups were thus included: (1) professionals submitting IMs, (2) technicians submitting IMs, (3) management submitting IMs, and (4) management not submitting IMs. As this was a limited study, not all possible groups were included (i.e., professionals and technicians not submitting IMs were excluded).

Instrument

The KAI contains thirty-three items derived from observations and intensive interviews with managers, as well as from a literature review on creativity. The respondents use a five-point rating scale to indicate how easy or difficult they would find it to present themselves in this manner for prolonged periods of time. In scoring the KAI, scores may vary between 32 and 160 (see Figure 2, p. 82). The mean score for the normal population is 96.

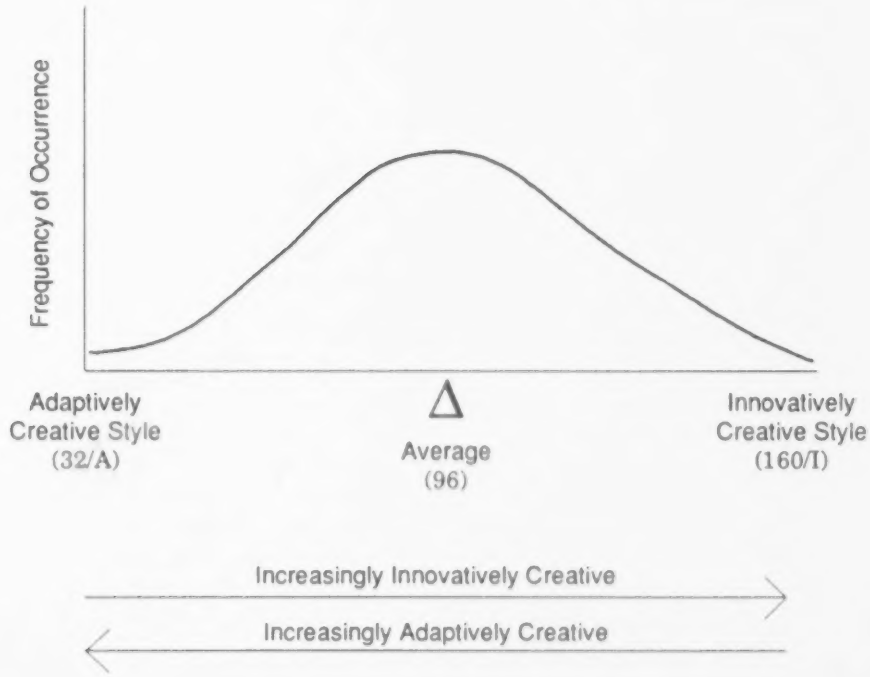


Figure 2. ***KAI (creative style, NOT creative potential)***

Results

Table 1 indicates the population size and corresponding return rates of individuals on the KAI by company position and IM submission rate. Eighty-two percent of those individuals submitting IMs responded to the KAI, as did over ninety percent of those individuals submitting three or more IMs. It should be noted that there was great variability in population size. For example, the population of managers not submitting IMs contained thirty-four individuals, whereas the population of managers submitting IMs contained only eight. The subset of managers submitting three or more IMs contained two individuals. As would be expected, there was a larger group of professionals (111) and technicians (18) submitting IMs.

Table 2 contains summary data classified by position and IM submission rate. The numbers in the table indicate raw scores on the

Table 1. *KAI: Population Sampled and Return Rates by Position and IM Submission Rate*

		Total Group of IM Submitters			
	Management NOT Submitting IMs	Management Submitting IMs	Professionals	Technicians	Total
Population Size	34	8	111	18	137
Return Rate	56%	100%	80%	83%	82%
		Individuals Submitting 3 or more IMs (subset of Total Group)			
Population Size		2	15	3	20
Return Rate		100%	87%	100%	90%

Table 2. *KAI: Summary Data by Company Position and IM Submission Rate*

* A = Adaptor
** I = Innovator

		Total Group of IM Submitters			
Score	Management NOT Submitting IMs	Management Submitting IMs	Professionals	Technicians	Total
Range	77/A* – 148I**	104/I – 132/I	78/A – 144/I	63/A – 135/I	63/A – 144/I
Mean	103/I	114/I	115/I	105/I	113/I
Median	103/I	113/I	115/I	106/I	114/I
S.D.	±17	±11	±15	±18	±16
		Individuals Submitting 3 or more IMs (subset of Total Group)			
Range		115/I – 132/I	85/A – 144/I	107/I – 135/I	85/A – 144/I
Mean		124/I	124/I	122/I	124/I
Median		124/I	126/I	125/I	125/I
S.D.		±12	±15	±14	±14

KAI. A quick glance at this table indicates that: (1) The mean score of managers and professionals submitting IMs was quite comparable (114 for managers and 115 for professionals). (2) The mean score for managers not submitting IMs was more adaptive, as indicated by the score 103. (3) The mean score for technicians submitting IMs was also more adaptive (105).

These data are represented graphically in Figure 3. As would be expected in a research lab environment, the distribution was skewed to the innovatively creative side of the Kirton continuum with a mean score of 113 and a standard deviation of ±16.

Testing the assumption that individuals who submit a large number of IMs were more innovatively creative in style than their direct management, the data on individuals who had submitted three or more IMs were examined. Managers and professionals submitting three or more IMs both had a score of 124. Technicians submitting three or more IMs had a mean score of 122. Graphic representation of these data is shown in Figure 4. The mean KAI scores for managers not submitting IMs was 103 (see Figure 5). This was significantly more adaptive than the mean scores of the total group of individuals submitting IMs.

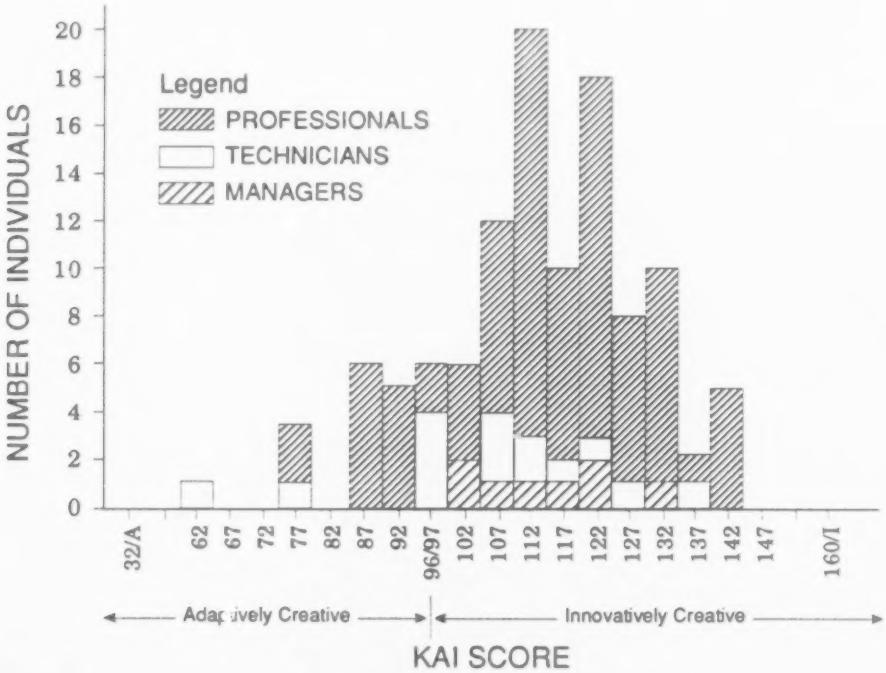


Figure 3. ***KAI scores of IM submitters by position***

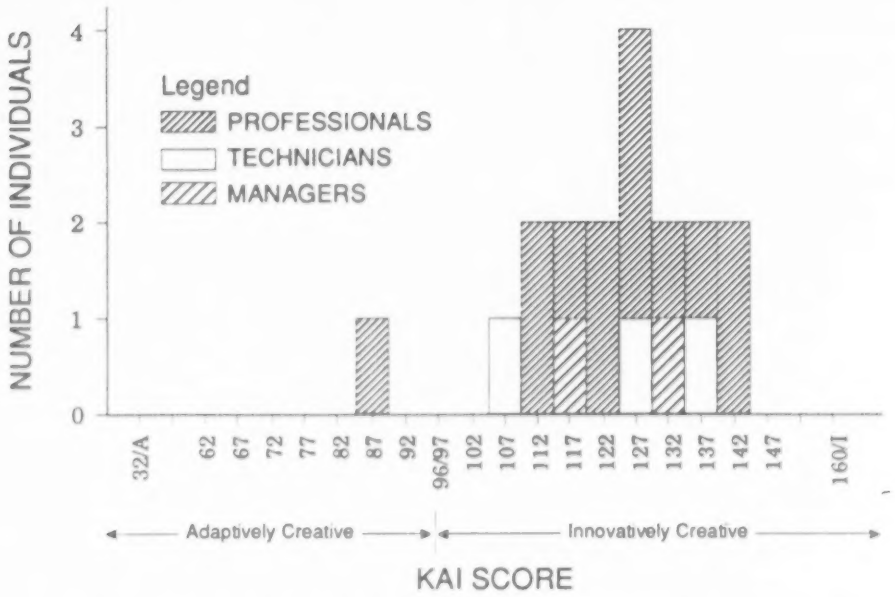


Figure 4. ***KAI scores of individuals submitting three or more IMs***

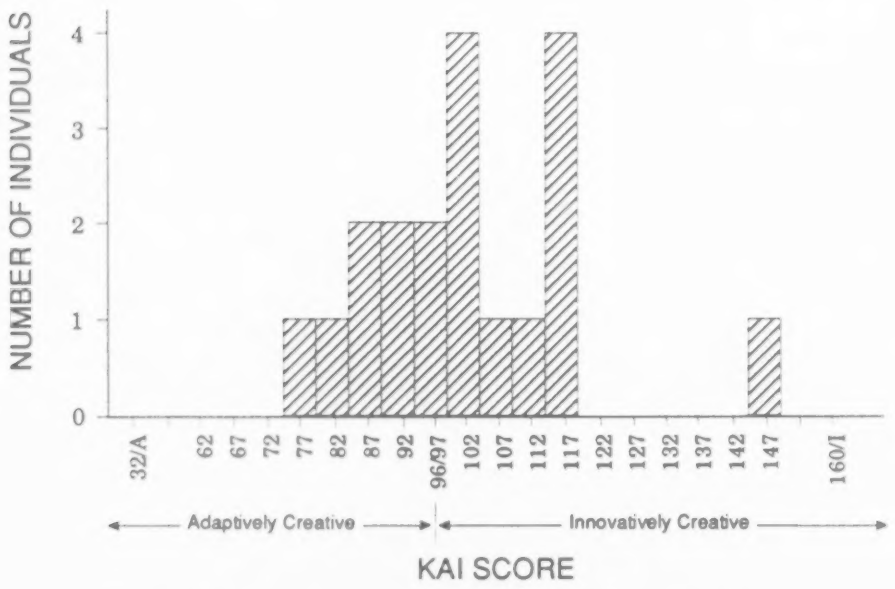


Figure 5. ***KAI scores of managers NOT submitting IMs***

Discussion and Conclusions

The use of the KAI indicates that the styles of those individuals submitting IMs, both managers and professionals, were quite comparable. This implies that individuals with innovatively creative styles assume many different roles at Kodak. These results also indicate that the KAI score of managers not submitting IMs was more adaptive than those submitting them. The KAI test scores for the managers (IM and non-IM submitters, mean score = 106) are not unique to Kodak and can be cross-validated by a data base described by Kirton (personal communication, 1982). In a random sample of 256 R&D personnel (Keller & Holland, 1978) and 90 R&D managers (Gryskiewicz, 1982), the KAI mean scores were 101 and 104, respectively. Taken at face value, the comparison of the Keller and Holland (general R&D personnel) and the Gryskiewicz (R&D managers) data suggests that managers have a more "creative style" than their staff. The Keller and Holland R&D personnel sample cannot, however, be compared to the Kodak sample because the professionals and technical personnel in our study represent a selected subset of Kodak R&D personnel (i.e., IM submitters only). Within the Photographic Divisions of Kodak Research Laboratories those individuals submitting three or more IMs had an average KAI score of 124, which suggests an operating style that is very different (i.e., more innovatively creative) from that of the majority of management tested.

Conflicts

Many adaptively creative managers and those IM submitters with high "I" scores may have conflicts with one another. Those things which adaptively creative individuals value (such as structure, continuity and predictability) may be at odds with the variation, extra energy, and desire for change which the more innovatively creative individuals need. When such an individual generates an idea outside his assigned line of work and brings it to his more adaptive management, it is often viewed as an annoyance. It does not fit into the structure within which the manager operates. In turn, the manager's response leads to frustration on the part of the innovator.

A Relay Team Approach

The data in addition indicate that many individuals with innovatively creative styles like to start projects but do not necessarily

carry them through to completion. Individuals with scores in the 126-137 range stated that "if there are too many of us, nothing gets done," they "stop once the end is seen," and they "hate to translate thoughts into written words." On the other hand, individuals with more adaptively creative styles expressed continuity, dependability, and stability as advantages of their style. Again, conflicts may arise due to these differences. What compounds this problem even more is that individuals in the 106-116 range say they "see both points of view." Therefore, they may not understand why others with more innovative scores cannot follow through. What is recommended is a team approach which combines the skills of innovatively creative individuals generating ideas with the follow-through skills of those with more adaptively creative styles.

Suggested Changes

Several structural and procedural changes are suggested by an acknowledgement of differences in creative style.

Team building can be conducted, taking into account both style differences of the individuals and the kind of outcome desired of the team by the organization. If a radical outcome or solution is needed, the adaptive-innovative mix and interplay can be different than if the outcome sought is to be an incremental improvement.

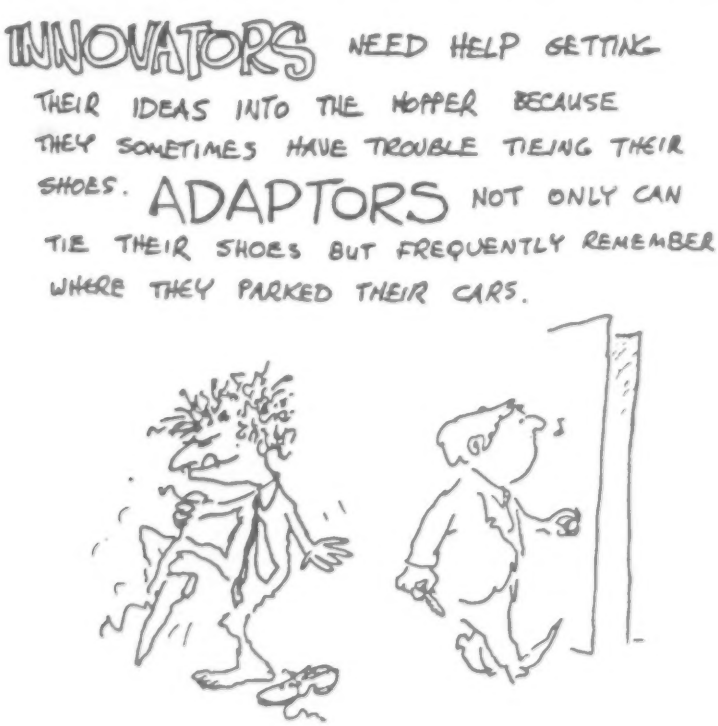
Ideas from innovatively creative individuals can be bubbled up to management. Adaptively creative individuals have an outlet for their style; they form the mainstay of the present organizational structure and are predominantly responsible for the present and near future income of the company. Innovatively creative individuals, however, lack an outlet. Both the innovator and the company suffer if one is not found.

An environment filled only with adaptors may result in stagnation, whereas one consisting solely of innovators may result in lack of visible productivity. In a large corporation it is necessary to utilize those individuals that see into the future in order to explore areas for potential diversification.

Management has an obligation to grow and, therefore, needs to put in place the means whereby the creative talent of their people is tapped for the kind of ideas that will allow growth: You're betting on people to provide the spark that will ignite tomorrow's fire, which in turn will have to be managed if it is to get anywhere.

In a small company a special conduit for ideas is usually not necessary because the entrepreneur is frequently both a manager and

an innovator. Also, in a small company the entrepreneur is not far removed physically from those employees generating ideas. Another characteristic of small companies that affects innovation is the lack of a large middle management "filter." Large companies have several levels of filter which make it difficult for ideas to get to the decision level of the corporate structure. In large companies it is generally not a prerequisite for a middle manager to be an innovator. What makes sense in larger, more bureaucratic organizations is an innovation system which provides a legitimate channel for ideas to bypass many of the unnecessary filters. The system also decreases the amount of time it takes for an idea to reach the proper decision-making body.


INNOVATORS NEED HELP GETTING THEIR IDEAS INTO THE HOPPER BECAUSE THEY SOMETIMES HAVE TROUBLE TIEING THEIR SHOES. ADAPTORS NOT ONLY CAN TIE THEIR SHOES BUT FREQUENTLY REMEMBER WHERE THEY PARKED THEIR CARS.

As technological trends develop, management can use channels such as an Office of Innovation to elicit related ideas from innovatively creative individuals. Since a difference in style exists between IM submitters and those managers who do not submit IMs, an innovation system must be designed to meet the needs of both. A facilitator of an innovation system needs to be able to relate to the range of creative styles (from adaptive to innovative). The facilitator thus becomes a bridge between the innovatively creative group and its usually more adaptive management. This would improve the flow

and implementation of ideas, without style acting as an impediment. Management could use "idea ticklers" (i.e., a newsletter indicating areas in which upper management is interested in soliciting inventions) to inform potential inventors of current interest. As inventors become actively involved in the growth of the company, they will feel that they have a greater share in the company's future. This should reflect itself positively in increased productivity.

Invest in people, not ideas. There are many possible ways to "invest" in creative people. These include eliciting their ideas in a personal fashion, helping idea-originators to develop and evaluate their ideas, and educating them as to how to get their ideas implemented (i.e., become product champions). What is needed is a program which identifies and invests in those creative, innovative individuals within a company irrespective of their personality traits and work styles. A final and difficult way for managers to demonstrate such investment is to sustain the commitment to individuals when a specific idea doesn't happen to pan out. The organization must keep in mind that some day one or more of these individuals may come up with the big idea that becomes the backbone of the company's profitability for years to come. By investing in these individuals, management is also creating and maintaining a climate for creativity. People will then more freely offer their ideas. Out of these, the so-called good ideas will emerge.

This approach reflects a subtle difference in emphasis but one which may make the difference between future success and failure in a quickly changing economy. Garnering good ideas can be accomplished in various ways. One way is through the use of a suggestion system. This approach can be likened to searching for rose blossoms in a field. The wild rose bush has many prickly branches and very few perfect blossoms. Investing more directly in creative people is like domesticating and cultivating roses in a garden. By carefully tending the garden one produces the best flowers, and by picking the plant frequently, one gets more flowers of higher quality. As with the garden, if creative people are carefully tended, they will develop. If their ideas are not evaluated properly, innovatively creative people will decrease the production and quality of their novel ideas. It is not the plant's responsibility to cultivate itself; it is the responsibility of the gardener.

Develop acceptance of the diversity of creative styles. A vehicle such as an educational program is needed to enable both groups to see their value to the company and to each other. A useful way of visualizing the relationship between innovatively creative and adaptively creative styles is "contained disorder." It's like the core of a nuclear reactor. If the internal disorder is allowed to run rampant it

will destroy the reactor. Its containment, however, allows one to harness its energy and produce a balance. Adaptively creative individuals, which form the bulk of an organization, are like the reactor, and innovatively creative individuals are like the reaction within it. They need to work in harmony for the benefit of the organization.

Notes

[1]An IM is a written submission of an idea. An IM may be revolutionary or evolutionary. In either case, the idea is submitted to the Office of Innovation because it is outside the submitter's assigned work.

[2]For more information on PDOI's system and the role of the facilitator, see Rosenfeld (1981).

Acknowledgment

I thank Tom Whiteley, Director of the Emulsion Research Division (KRL), for allowing me to run this study and being supportive of the PDOI operation. I also thank Robert Bacon, my collaborator in setting up PDOI, for sharing his insightful approaches to people, and for inspiring me with his strong, long-term commitment to creativity and innovation. I am also grateful to Michael Kirton and Stan Gryskiewicz for being very cooperative in supplying the necessary data and allowing me to use the inventory. I am most grateful to Jenny Covill-Servo for her patience and time spent in putting together this paper and for sharing her statistical expertise and her understanding of different cultural interactions which supplied additional insight in looking at the creative style of individuals.

Finally, credit is due to those creative individuals for their trust, for their patience in working with PDOI, and most of all for sharing themselves.

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I first met Bob Rosenfeld more than fourteen years ago, when he was beginning to wrestle with the problem of bureaucracy and organizations. He continues to confront the difficult issue of growing and connecting ideas inside organizations, and he has formed a company called Idea Connections Systems, Inc., *through which he takes the skills he developed at Kodak into a variety of organizations. Always a champion of the individual, Bob is especially interested in exploring systems that generate trust among co-workers and nurture the development and implementation of the ideas of these individuals. Bob's interests have also taken him into the international arena through the United Nations. In this work he tries to alleviate racist attitudes toward minorities. Ever the optimist, he continues to do what it takes to live a life driven by his values.* **SSG.**
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Creating Healthy Change

Perry W. Buffington

It used to be that the Great American Pastime was baseball. Not necessarily so any more. There's a new pastime sweeping the nation, and it's called "change."

On the upside, people see change as a problem-solver. In order to get out of a bad situation, hundreds of thousands of people will change jobs this year. Moreover, approximately forty million of us will change our addresses. And more will attempt to change their personalities, lifestyles, spouses, and (most of all) the kids.

Unfortunately, there is a downside to change, and it involves unexpected changes, or those things which are difficult to control. In fact, there are some who believe that too much of either positive or negative change can lead to physical and emotional problems. There is even evidence that change may cause our internal biological clocks to malfunction.

This biological clock produces 24-hour rhythmic fluctuations observable in the metabolic processes of both plants and animals. These cycles, called "circadians" (from the Latin meaning "about the day"), are not the same as "biorhythms," which occur over a period of days. Circadians are very strong, essential to daily living, and tend to remain constant. These biological rhythms hardly fluctuate, even if you are cut off from all means of discerning day from night over a period as long as several months. However, as anyone who has ever crossed too many time zones in too short a time knows, rapid change will disrupt the process that requires the body to reset its biological clock.

Although these daily body rhythms are invisible, they relate to sleep, chemical constituents in the blood, hormone production, and temperature. For instance, body temperature tends to rise around seven in the morning and decrease around ten at night. Any abrupt change, causing a disruption of this daily rhythmic flow, may result in physical malfunction.

Empirical studies of disturbances in circadian cycles in humans (e.g., sudden change in sleep cycles) have shown that adaptability varies greatly from person to person. In experiments with simulated manned space flight, some participants responded well to unusual work schedules (work four hours; rest four hours). Other participants had great difficulty adapting and coping. One very interesting point must be made: Changes that the activities demanded of each subject did not vary from situation to situation. Each participant in the study was required to do the same thing. What did vary was the individual's ability to adapt, cope, and reset his or her biological clock.

Change may not be the culprit that produces problems; the problems may result from the individual's ability to adapt to change. Over the past 30 years, a great deal of evidence has suggested that the number of changes—controllable and uncontrollable, positive and negative—which occur in a person's life are related to illness. To measure this, certain life events have been given numerical values and are referred to as "life-change units." Examples of life changes include loss of a loved one, jail term, marriage, job termination, birth of a child, mortgages, holidays, family get-togethers, and others. Research has suggested that the greater number of these "life changes" experienced in a period of time (usually one year), the greater the probability of one's becoming sick. The more changes, the more vulnerable one's immune system becomes (Holmes, 1979).

These vanguard studies have pointed out that change takes its toll; however, more recent studies are suggesting that life change does not necessarily have to be debilitating or even associated with illness. The key to minimizing the harmful effects of positive and negative change appears to be resiliency—the ability to bounce back and effectively deal with, and adapt to, the effects of change. The real question then becomes: What is it that allows one person to bounce back effectively while another who experiences the same life change falls apart? The answer is related to the person's age and his or her expectations.

To test this idea, a study was conducted among undergraduate students (Cole, 1985). The study surveyed 87 male and 91 female undergraduates (between 18 and 30 years of age). The experimenters were looking for a relationship between life events which caused change and the prevalence of emotional problems. After administering a written survey which measured the number of life-change units over

the past year, it was found that 84.8 percent of the subjects had scores indicative of major life crises. To see if the participants also admitted to corresponding sickness or emotional problems, another scale was administered. Given the high percentage of stressful events in the students' lives, the experimenters expected to find a pronounced level of sickness. That's not what happened.

Though much change occurred in their lives, there was very little evidence of physical disorders. Only modest experimental support justified this conclusion that change and illness are related. In this group of subjects, change did not necessarily lead to emotional distress or illness.

This case contradicts other studies conducted with adults, which have shown that a great deal of life change can predispose one to physical and emotional problems. What caused the opposite results? One theory attributes the outcome to the participants, combined with the fact that the undergraduates would not allow illness to interfere as they progressed toward their goals in college. To further test the idea that one's ability to cope is related to age and life goals, let's take a look at a similar study that was done with an older population (West & Simons, 1983).

This study was composed of 132 men and 167 women over the age of 65. They completed a battery of tests designed to examine the relationship between life changes for each gender and vulnerability to illness. One other very important variable was assessed: The examiners also wanted to know if a person's coping resources played a part in adjusting to change.

The result suggested that older women responded more to change than older males. This is not an unusual finding, given the fact that women tend to express more emotion than men. The fact that excessive change is related to illness was also supported.

Even more interesting was the experimenters' findings that the usual coping techniques were not effective when related to the largely negative and uncontrollable events of old age. Having a marriage partner, confidant, or a strong self-concept were not effective aids in coping with excessive life change. As a result, the more uncontrollable life changes associated with aging at a rapid rate, combined with inhibited coping skills, contributed to the likelihood of illness.

Although the undergraduates cited earlier experienced many life changes, they admitted to little emotional distress. The 65-year-old groups were experiencing an increase in illness and emotional distress in conjunction with an increase in life changes. Although there were significant differences in the age groups, these two studies suggest that it is not change which is causing the problem but the ability to cope and to adapt to change. When one is young, with pristine goals

upon which to focus, the effects of change are more easily minimized. As one ages, with more and more accumulated failures and less time to achieve, change takes its toll.

There is no doubt that accelerated change has played havoc with our established norms and values. The rate and pervasiveness of change today is totally different from anything our ancestors ever experienced. Every facet of our lives is affected by change. Our educational system, jobs, family lives, leisure pursuits, economic positions, beliefs, lifestyles, and values are constantly in flux.

In the early 1970s, the concept of "future shock" emerged to describe a condition whereby social change would be exceedingly rapid. The result was expected to be profound confusion and emotional pain. Change which is too rapid produces "techno-stress," or the inability to adjust and to bounce back at a commensurate pace. There are ways to deal with this problem, however.

There are three important points to remember: Change can be minimized; belief in future goals reduces the deleterious effects of change; and, at the risk of sounding redundant, the way to deal with change is to change.

The most effective way to minimize change is through creative planning. If you are anticipating a relocation, start preparing several months in advance. Talk with people who have moved; take copious notes; write things down so that you will not forget the details. By doing this, you are making unfamiliar things seem more in line with your current regimen of behavior. The more understanding you have of a soon-to-happen event, the less debilitating change will be. First-graders who visit school several days before they start adjust better. Surgery patients who are thoroughly familiar with what is to happen heal faster. Visit a new city several times before your move. The more you know about a change, the less intimidating it is.

If you think that you are at the mercy of change, or that you have minimal control over a situation, then you are making yourself vulnerable to potential physical and emotional problems. If you are enduring a change in order to reach a higher plateau, or to fulfill expectations and desires, then the effects of change are overshadowed. Your goals and future orientation give you a reason for putting up with the hassles. By focusing on the positive goal, you are impervious to the negative side-effects of change. For instance, remember the young undergraduates who were content with their role as students. Focusing on obtaining a college degree reduced the negative effects of change and made them less vulnerable to illness.

Finally, the most effective way to deal with change is to change. Readjust your thinking and respond with positive action. Most of the problems associated with change stem from fear and inability to

develop a creative plan of attack. We get so caught up in life changes that it becomes very difficult to view the circumstances objectively. Because we do not know what will happen to us, we tend to blow situations out of proportion. The more negative your thinking concerning upcoming or unseen changes, the greater the probability of not adjusting well to change. If you are anticipating a change, get the facts straight. Become familiar with the problem, and never lose sight of your goals.

The bottom line is that change is not all bad but it is inevitable, and one of the few constants in daily living. You can't change that, but you can change your outlook on it. That's the first step in effectively coping with change.

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Early in his work with American Wellness Systems, Inc., Perry saw people who were experiencing success as distinctly stressful. He concluded that coping with upward-bound change ("success stress") is easier than coping with downward-bound change but that even positive change has the potential to create turbulence in one's life. The three key points in this article are guidelines for handling success successfully.

Perry received his Ph.D. in 1978 from the University of Kentucky. ***SSG.***

Facilitating Creative Problem-solving Groups

Scott G. Isaksen

If you were asked to name the inventors of the telephone, airplane, and lightbulb, you would probably experience little difficulty in recalling the names of Bell, Wright, and Edison. In contrast, many people experience difficulty in naming the "inventor" of the 747 jumbo jet, the 800 inward watts number, and the silicon chip. Aside from the major differences of level of inventiveness and how much more current the latter three products are, a major difference between these two categories is that the more recent products have been the result of group creativity.

The growing importance of group creativity is being recognized by all types of organizations (Freedman, 1988; Kuhn, 1988). The need for organizations to be competitive, to deal with increasing levels of complexity, and to change has forced managers, administrators, and others who are concerned with the future viability of our places of work to deal with innovation and creativity. Although many think of creativity as primarily an individual affair, there is a need to examine the application of this personal power within the context of groups. Creativity in groups and in individuals is not an either-or affair. When you are concerned with facilitating group creativity, you must simultaneously be able to address the issue of promoting individual creativity.

Groups have been defined in many different ways. Most definitions point out that a group is something more than the simple sum of its members. The following definition, provided by Johnson and Johnson (1982, p. 7), will be used for this paper:

> A group is two or more individuals in face-to-face interaction, each aware of his or her membership in the group, each aware of the others who belong to the group, and each aware of their positive interdependence as they strive to achieve mutual goals.

Hanson (1981, p. 10) has indicated that "as society becomes more complex and organizations become multi-faceted, decisions that affect many lives are rarely made by individuals alone. More and more decision making is done within the context of a group." This emphasis

upon group creativity need not diminish the significance of individual creativity. Indeed, there are many occasions which call for the application of individual skills and abilities toward the development of creative solutions. This changing emphasis does, however, call for more involvement on the part of individuals working together to achieve efficiency and innovation. Lawrence and Dyer (1983, p. 267) reviewed the abilities of organizations to structure themselves for innovation. They "found no instance of an organization's having a record of high efficiency and high innovation without evidence of active involvement throughout the organization."

Change, complexity, and competition provide the impetus for increased creative collaboration. Gray (1989, xviii) indicated:

> Finding creative solutions in a world of growing interdependence requires envisioning problems from perspectives outside our own. We need to redesign our problem-solving processes to include the different parties that have a stake in the issue. Achieving creative and viable solutions to these problems requires new strategies for managing interdependence.

Leaders and managers concerned with the most productive means and guidelines for using groups have frequently attempted to gain some clear indications from research in the social and behavioral sciences. It is beyond the scope of this paper to review the relevant empirical literature on the use of groups in problem solving and planning for organizational change (see Bass, 1981; Hackman, 1990; Hackman & Morris, 1975; Hare, 1976; Hare, 1982; Hoffman, 1979; and Lippitt, Langseth, & Mossop, 1985, for more comprehensive treatments). It is important to recognize, however, that the current status of this literature does not shed significant light on the subject. For example, Hackman and Morris (1975) indicated:

> In sum, there is substantial agreement among researchers and observers of small task groups that something important happens in group interaction which can affect performance outcomes. There is little agreement about just what the "something" is—whether it is more likely to enhance or depress group effectiveness, and how it can be monitored, analyzed, and altered.

Despite the lack of clear direction from research, groups continue to be important factors in organizational decision making and problem solving. Frequently, the necessary information for solving a problem is scattered in a group. In addition, the acceptance and comprehension of

a decision by others is frequently as important as the actual quality of that decision.

If the empirical literature does not provide clear direction for those interested in the effective management of group problem solving, it will be important to identify alternative useful sources. There are a variety of developments which can provide some productive information and assistance. In a recent examination of the basic skills employers seek to be more competitive and to develop successful employees and organizations, Carnevale, Gainer, and Meltzer (1990) found:

> Increasingly, employers have been discovering that their work forces need skills that seem to be in short supply, skills over and above the basic academic triumvirate of reading, writing and computation. The skills that employers are looking for include problem solving, personal management, and interpersonal skills as well as the abilities to conceptualize, organize, and verbalize thoughts; to resolve conflicts; and to work in teams—all of these skills are critical but often lacking.

Their book provides a wealth of information on the sixteen clusters of skills they found employers demanding. A strong theme through all these clusters was the ability to work and solve problems effectively with groups. Employees need to develop skills which help them meet new challenges and make productive contributions when working in teams.

The movement to develop skills and abilities of teamwork, creative thinking, and problem solving is not restricted to U.S. industrial or organizational settings. The movement is occurring on an international level (Colemont, Grøholt, Rickards, & Smeekes, 1988; Grønhaug & Kaufmann, 1988), throughout our educational institutions (Deal, 1990; Isaksen, 1988a; Isaksen & Parnes, 1985; Tuerck, 1987), and within the public sector (Merritt & Merritt, 1985). This increased attention on group creative problem solving has a high degree of relevance for school improvement initiatives, organizational effectiveness, as well as the quality and continuous improvement movement within organizations.

The purpose of this paper is to provide useful information for people who wish to facilitate creative problem solving—that is, those interested in using groups to understand problems and challenges, generate ideas, and plan to put these ideas into action. This information will include a brief description of creative problem solving and the roles of facilitator, client, and resource-group member, as well as a

consideration of a variety of group-management issues. The paper will close with some suggestions for those who have recently learned CPS and would like to facilitate its use with others.

Creative Problem Solving

One of the ways to promote group creativity is through the effective facilitation of creative problem solving. CPS is a broadly applicable process that provides an organizing framework or system for designing or developing new and useful outcomes. It enables individuals and groups to recognize and act on opportunities, respond to challenges, and overcome concerns.

CPS is not merely "problem solving." The creative aspect to CPS means the focus is on facing new challenges. It means seeing these new challenges as opportunities; dealing with unknown or ambiguous situations and productively managing the tension caused by gaps between your vision of future reality and actual current reality. A few of my colleagues prefer to use the term *creative opportunity-finding*, but I feel the "creative" modifier means that we are not concerned with the reproductive, menial, or mundane kind of problem solving. Learning and applying CPS is a means toward understanding and nurturing the creativity residing in each of us.

There are many creative problem-solving procedures designed to assist groups to solve problems and meet goals effectively (Egan, 1988; Isaksen & Treffinger, 1985; VanGundy, 1981). It is beyond the scope of this paper to review these procedures (see Isaksen, 1988b, Price, 1985, and Stein, 1975, for more information). Rather, this paper focuses on the notion that these procedures can assist the group in being more deliberate and explicit in better understanding the nature of challenges, opportunities, and problems; generating options; and analyzing, evaluating, and implementing them. These creative problem-solving techniques have been used in business and industrial settings (Basadur & Finkbeiner, 1985; Basadur, Graen, & Green, 1982; Gryskiewicz, 1981) as well as educational organizations (Isaksen & Parnes, 1985). There are also many training programs in creative problem solving available through the Center for Creative Leadership, the Center for Studies in Creativity, the Creative Education Foundation, the Center for Creative Learning, and a host of other organizations.

There is an abundance of models and approaches to CPS (Costa, 1985; Gordon & Poze, 1981; Kepner & Tregoe, 1981; McPherson, 1968; Prince, 1970; Sampson, 1965). Some models are relatively prescriptive; they attempt to give the user a detailed map with a particular

preplanned route highlighted for use. Other approaches are relatively descriptive; they attempt to provide the user a map or framework he or she can use to find their own way. Whether the model is prescriptive or descriptive, all models attempt to outline the stages of thinking or problem solving and to provide some indication of the techniques which might be utilized along these stages.

Our view (Isaksen & Treffinger, 1985) outlines three main components for CPS. The first includes seeking opportunities and establishing goals for problem-solving efforts, examining the challenge or concern from many different perspectives, and considering many possible problem statements to gain a better understanding of the problem, challenge, or opportunity. The second includes generating many, varied, and unusual ideas and identifying those ideas which are promising or have interesting potential. The third is concerned with planning for action. Criteria for analyzing and refining promising possibilities are identified and then chosen to select, strengthen, and support the promising tentative solutions. In addition, emphasis is placed on considering possible sources of assistance and resistance, as well as formulating and implementing a specific plan of action. These three components are used in any order and in any way necessary to help the client meet goals and achieve opportunities.

The important point is that there are many methods and techniques which can be used to help the group be more effective in balancing creative and critical thinking to provide a more effective type of group problem solving. Our current approach to CPS requires the use of both divergent and convergent thinking to generate and communicate meaningful new connections as well as to analyze, select, and develop new possibilities. Applying these group procedures is a significant challenge for the trainer, teacher, manager, supervisor, executive, or anyone interested in utilizing group resources.

There are many factors that must be considered when planning to productively utilize groups. Knowledge of the actual procedures and how they work is the primary set of competencies upon which to build. This knowledge and personal experience in applying the techniques can strengthen one's understanding of why certain methods may result in certain types of outcomes.

CPS provides a unique context within which to examine leadership and group dynamics. Hackman (1990) sets forth three basic attributes which must be present if the label *work group* is to be applied. Groups using CPS are real groups if they are intact social systems with boundaries, interdependence, and differentiated roles among members. They have specified tasks to perform and responsibility to produce outcomes. CPS groups operate within a larger social context in that there is usually clientship for challenges and opportu-

nities on which CPS is applied. These clients have responsibility to implement and use the outcomes provided by the group. Although effective application of CPS is not limited to groups, some of the most powerful benefits of using it can be realized in small-group application. Consideration should be given to readiness of the group to use various techniques.

The Facilitator Role: Group-oriented Leadership

There are many approaches to understanding the concept of leadership. One of the earliest was to focus on the attributes, traits, and characteristics of effective leaders. Another approach examined the style of leadership or the balance between concern for task and concern for people. More recently, we are trying to understand the situation and contingencies for the productive application of leadership. Whatever your approach to studying leadership, one thing is clear: Leadership is related to followership. As Gardner (1990, xii) indicated,

> Leadership is such a gripping subject that once it is given center stage it draws attention away from everything else. But attention to leadership alone is sterile—and inappropriate. The larger topic of which leadership is a subtopic is *the accomplishment of group purpose,* which is furthered not only by effective leaders but also by innovators, entrepreneurs and thinkers; by the availability of resources; by questions of morale and social cohesion; and by much else.

If a decision is made to involve a group in creative problem solving, it is helpful if the style of the leader is consistent with the notion of group participation. It would be counterproductive if the leader were to autocratically order all group members to participate and to insist that they enjoy it. It is also important to understand the unique style and skills necessary for effective facilitation. This special type of group-oriented leadership role focuses on the effective utilization of group resources.

During a typical creative problem-solving session, a group is led by a *facilitator*. The facilitator is the person who takes primary responsibility for the process and procedures with which the group will be involved. He or she structures and prepares the environment, acts as a catalyst for releasing and focusing the efforts of group members, uses appropriate methods and techniques, and is sensitive to the variety of group dynamics. For more information regarding the role

and responsibilities of the facilitator, see Firestien and Treffinger (1983a, 1989a, 1989b, 1989c) and Isaksen (1983).

The responsibilities of the facilitator are rather complex. The effective CPS facilitator must also be an excellent trainer or teacher as well as a situational leader. When groups first get together to use CPS some energy must be invested in helping members understand the basic ground rules, roles, and specialized "language" associated with CPS. As the members become competent and committed, the facilitator can move them into the application of CPS. It is when the group is actually working on a specific task that the facilitator has a highly complex challenge. When the group is actually working in context it becomes very difficult to keep the focus on process. The group will naturally focus a great deal on the content of the situation. The facilitator will need to be committed to focusing on the process in which the group is engaged.

Characteristics of an Effective CPS Facilitator

An effective facilitator of CPS must have many attributes. Parnes (1985) used the term *facilitator* to identify

> the leader who draws out, reinforces and facilitates the creative learning, development and problem solving of the people with whom he or she is working. The person facilitating creative behavior is aware of the creative process and first understands it in himself or herself, and then is able to help others see and strengthen it in themselves.

The word *facilitator* means a variety of things to different people. For those of us concerned with the learning and application of CPS, it has a special meaning. One of the best ways to define it is to identify the important attributes a facilitator must possess. The following characteristics have been identified as key abilities and skills associated with effective facilitation of CPS. These are given in no particular order of importance, and the list is not meant to be complete.

A facilitator must have process-awareness and expertise. Aside from all the other abilities and skills that would help one communicate and effectively manage the interaction between a variety of individual roles, a CPS facilitator needs to have an awareness of a variety of methods and techniques for use during a creative problem-solving session. Having the ability to use a diversity of tools allows the facilitator to fully utilize the resources of the group.

The facilitator must possess a clear and productive understanding of the conceptual framework of CPS. This includes knowing the specialized CPS terminology and guidelines and understanding the subtle differences among the concepts of the CPS framework, components, stages, phases, and tools. In addition, the facilitator needs to make decisions about the effective application of the many CPS tools. It is also quite helpful for one to have a number of other process languages at his or her disposal. For example, it is very helpful to be able to make connections between CPS and Targeted Innovation, Synectics, or Kepner-Tregoe. Some people may not have had direct training in CPS but have had some experience with another process model.

While the group is learning about CPS, preparing to apply the tools and actually engaged in problem solving, the facilitator must be able to maintain an awareness of the group process and dynamics as well as keep an eye on the time, energy, and client's needs. In short, the facilitator must be able to juggle quite a few issues at once. The major expertise necessary for CPS facilitation is the ability to set an appropriate environment by removing barriers to effective use of personal and group creativity and accelerating progress toward the end in view. Having awareness and expertise with the CPS process helps one to remove barriers and improve the environment for creativity.

A facilitator must be clear about role. A facilitator also has the responsibility of managing productive interaction with both the client(s) and the resource-group members. In theory, there is a clear difference among the roles of facilitator, client, and resource group. However, when groups are engaged in CPS, these roles become less clear and manageable. The role of the CPS facilitator encompasses teaching and leading as well as managing the other social roles of client and resource group.

In a sense, the facilitator must function as a participant-observer within the group. When needed, the facilitator provides the necessary process intervention from a content and CPS perspective but must always have the clear awareness of the purpose and goal of the session.

A facilitator must have people skills. The CPS facilitator must feel comfortable with a social role which involves a great deal of interaction with other people. Facilitators need to be able to deal effectively with group dynamics, interpersonal skills, and communication. Handling those sudden changes of course which often occur in groups is a constant challenge. An effective facilitator knows how to observe and utilize the interest and motivation of others toward productive outcomes.

A facilitator must manage content-process balance. It is important for the facilitator to be able to listen to a client and understand the nature of the problem or challenge. In a sense this means being a quick study for the main ideas and key data within the domain of the client. It is probably quite helpful for the facilitator to have a broad background and a good general vocabulary to help acquire knowledge from a variety of contexts. More importantly, managing the balance between becoming an expert within the specific problem domain and offering appropriate process interventions is a major area of judgment for the CPS facilitator.

A facilitator must leverage personal experience. The effective CPS facilitator must be able to draw upon a wealth of personal experiences which illustrate key learnings about the process. Some of the most learnable moments occur when a CPS facilitator shares with others specific interactions and events and the key lessons they provide. These actual examples really help others learn the value and most productive use of CPS technology. Providing these examples fosters trust in the process. Sharing these experiences also provides a role model of healthy intellectual competence coupled with genuine and personal disclosure.

Not only is it important for the facilitator to draw on past experiences, he or she must also make good use of current learning opportu-

nities. It is possible to learn from current programs and process interventions valuable lessons which insure future productivity.

A facilitator must manage divergence-convergence balance. A central dynamic to manage when facilitating CPS is knowing how to diverge as well as how and when to stop diverging. Bringing divergence to a close is not synonymous with convergence. Making the transition to productive application of convergent thinking is a key challenge. Having a deep understanding of the guidelines for generating options as well as analyzing, developing, and refining options is a key initial step.

If there is one technique which is the most widely known, it surely is brainstorming. Many people, however, equate brainstorming with the entire CPS framework. It is important to maintain conceptual as well as practical balance when learning and applying CPS. It is astounding that many creativity practitioners still equate creativity with divergence! Most organizations with which I am familiar have no shortage of ideas; they do have tremendous needs for focus and follow-through.

A facilitator must have appropriate personal qualities. There is a wide variety of specific personal qualities associated with effective CPS facilitators. I am certain that there is no particular mold from which all excellent CPS facilitators must be formed. There are, however, some broad personal characteristics which are likely to be held in a diversity of individuals and in unique ways—for instance, being able to show enthusiasm and having a genuinely optimistic attitude; having positive beliefs about creativity; having enough belief-in-self to be able to ask the group for help; having a sense of humor; and possessing a high degree of personal integrity.

A facilitator must manage logistics. A major responsibility of the facilitator is the establishment and management of a productive learning and thinking environment. Being able to manage the planning of a wide range of details is very helpful. Some of these logistical issues include: having a variety of available resources; arranging the sitting so that there is adequate eye contact; preparing people to dress casually (where appropriate); and demonstrating to those involved in the training and group sessions that their needs have been considered.

Dealing with logistics is often downplayed as an important quality of effective CPS facilitators, but there have been sessions that have not worked as productively as they might have because no one was concerned with making sure there was a flipchart or markers.

A facilitator must be able to teach and train. Before the facilitator can engage individuals and groups with CPS, he or she must be certain that they are as prepared as possible to benefit from

the process interaction. One of the most important roles a facilitator can perform is that of educator: bringing out that which is within.

Before groups are in the position to apply CPS, they must know its language, guidelines, and tools. Often this means providing very individualized approaches to learning the necessary prerequisites. It can also mean designing and providing explicit and deliberate large-scale training programs.

A facilitator must match style to situation. The facilitator must be able to manage the transition from teaching and training to actual engagement on a real challenge. This requires that those involved know enough about what they need to do and are ready to apply CPS, which in turn requires one to make a series of assessments of the competence and commitment of group members to effectively use CPS. It is a serious mistake to assume that because group members know how to brainstorm that they are ready for effective application of CPS technology.

A situational approach to providing leadership is absolutely necessary. Moving individuals and groups from a learning mode to a doing mode, and then reflecting on that which was done, takes a special level of expertise and lots of practice.

Managing the Client

It is important for group members to know that their efforts have some meaning and relevance. This can be achieved only if someone within the group has a sincere interest in implementing the solutions the group generates. Thus, the facilitator interacts with a client. This is the individual who has decision-making authority or ownership over a particular situation or challenge. The role of client in CPS groups supplies content-related expertise and provides convergence and decision making during the group's session. The client helps to keep the group on track by clarifying the situation, choosing directions and approaches, and participating in the group's session. In the final analysis, it's the client who needs to have a problem solved or an opportunity reached. Therefore, the role of client is an important one in determining the effectiveness and productivity of the group's effort. (For more information on the client's role, see Firestien and Treffinger, 1983b.)

Clients need guidance from the facilitator for making choices and judging at appropriate times, and they need to have support for permitting, encouraging, and participating in the divergent activities of the group. Clients must demonstrate sincere interest in working with

the group and process to bring about change. For clientship to be present, there must be room for a new approach or fresh idea which the client is willing and able to implement. The client must also have enough clear influence to implement the outcomes of the CPS process. This type of ownership builds commitment to the group process and helps in the development of effective groups.

The role of client helps to provide the group access to a clear definition of the task at hand. The client shares the most important background data and provides other information the group needs to know before proceeding. Elements of the client's task must be specified and have clear connection to his or her responsibilities. In short, the client provides much of the expertise necessary for productive problem solving.

Many times it is possible to identify one clear client. At other times, the ownership is distributed within a group. More broadly, there are some challenges and opportunities that have widely distributed ownership. For example, all of us are currently concerned about global warming or the threat of nuclear destruction. Managing group clientship provides the facilitator an even more complicated challenge. Usually, group clientship requires special attention to the convergent aspects of CPS. It may be necessary to modify the process technology, the time frame within which the group will work, and other factors when working with more than one client.

Characteristics of an Effective Client

A distinction must be drawn between client and clientship. A client is a person who has a particular social role before, during, and after a CPS session. Clientship is synonymous with ownership. Ownership implies that there is sufficient motivation or interest to work on the problem or challenge; sufficient authority, responsibility, or influence to take action; and a need to consider novel approaches which require the use of imagination. In addition to ownership, there are a number of other characteristics held by many of the most effective clients with whom we have worked. A few of the more important of these characteristics are described below.

A client must be genuinely interested in taking action. Effective clients are interested and motivated to deal with the problem situation. They display a positive attitude and commitment by attending and actively participating in all planning meetings and group sessions as well as by taking action on the outcomes of meetings. They actively seek involvement and contribution from others.

A client must have authority and responsibility for the problem situation. Effective clients have the authority and responsibility to take action on the problem situation. They are able to engage in CPS, see value in its use, and take action on its outcomes. It is possible for a client to be a sole proprietor as well as a stakeholder. Ownership may be closely held or widely distributed. In either case, the actual level of responsibility and breadth of accountability for implementation must be clearly identified.

A client must be willing to change or modify paradigms. Effective clients are willing to change or modify existing ways of doing tasks. They consciously seek novel and imaginative outcomes. They promote the involvement of "outsiders" as resources to assist in providing a diversity of novel perspectives.

A client must be committed to the use of CPS. Effective clients understand the value of CPS and are willing to provide the time, energy and planning necessary for productive outcomes. They see value in all three CPS roles (client, facilitator and resource group) and take the responsibilities associated with their role seriously. They actively collaborate with facilitators to plan, deliver and debrief the CPS session.

A client must trust the CPS process. Clients often become involved in CPS activities with which they are not familiar. Effective clients trust the process, following the guidelines and principles necessary to provide the desired outcome or result. They remain open to the generation of novel and unusual perspectives and tolerate the ambiguity which might accompany the use of certain CPS principles and techniques.

A client must be flexible in thinking and perceptions. It is often necessary to shift gears and pursue new avenues or directions. Effective clients remain open to the changes in direction. They listen and accept different approaches taken during various stages and phases of CPS. They stay open to the fact that they might change their mind.

A client must have good people skills. Effective clients have the ability to make others feel at home and supported. They read the facilitator and resource-group members and know when and how to respond. They maintain an appropriate level of eye contact with others and listen carefully to options; their nonverbal behavior matches the purpose of the session as well as their verbal comments; they provide an appropriate level of encouragement without smothering or controlling the session.

A client must have integrity. Effective clients believe strongly in the value of diversity and the importance of unleashing human

creativity. They see value in working with people to identify and solve problems. They see people are part of the solution, not the problem. They are honest in dealing with others and themselves. When the possibility of a hidden agenda emerges, they are able to identify it openly and find productive alternative approaches.

A client must have expertise in the problem area. Productive CPS outcomes can often be influenced by the knowledge level and experience of the client. Effective clients are knowledgeable in the problem area to the point that they can communicate the nature of the situation in a simple and understandable manner. In effect, they know their area so well that they could describe it to an eight-year-old child. The client's knowledge and expertise is often necessary for making some sense out of the novel perspectives generated during CPS. There may be special applications of CPS with groups of experts within a particular content domain. Generally, however, if there must be an expert in most CPS sessions, it should be the client.

A client must have process-awareness. Effective clients are willing to learn and understand the CPS process. They have a general level of awareness of the roles of a CPS session and how the techniques will operate and can effectively communicate with the facilitator and the resource group using CPS language. After applying the process, they often engage in a postsession meeting designed to provide feedback about the general level of productivity, the outcomes which were most useful and intriguing, how the techniques generated the variety of outcomes, and if and how the application of the CPS process added value.

Effective clients often take the responsibility for communicating these learnings to the facilitator and the resource-group participants. They see the entire affair through a systems approach. They actively seek out productive learning from the investment everyone has made in the CPS session.

Client-Facilitator Planning Meeting

One of the most important ways the facilitator can manage the CPS client is to design and manage an effective client-facilitator planning meeting. The purpose of the client-facilitator planning meeting is to establish the direction for the creative problem-solving session or activity. The focus is upon identifying the desired outcome and establishing the appropriate process agenda. It may be helpful to consider the following suggestions when approaching this special kind of meeting.

Clarify Roles and Expectations

The meeting between the client and facilitator is very important to insure the appropriateness of using CPS on the client's task. CPS is not a panacea, so the facilitator needs to determine the match between the CPS process technology and the actual challenge upon which the client will work. It may be necessary to refer the client elsewhere, provide additional planning time, or simply advise against using CPS. There is no magic to the productive application of CPS. This meeting provides the opportunity to brief and coach the client to increase the likelihood of a successful outcome.

The facilitator and the client meet to discuss their respective roles and responsibilities.

Client and facilitator agree to use CPS as a road map and common language to address the challenge, problem, or opportunity.

The facilitator checks the advisability of using CPS on the client's challenge and determines, with the client, the next steps.

Identify Outcomes and Obstacles

The client-facilitator planning meeting also provides the opportunity to become familiar with the client's context. While listening to the background provided by the client, one has the chance to check out the orientation of the client as well as the outlook on the situation. Depending upon the time frame of the meeting, the facilitator may wish to obtain more specific and detailed information on orientation and outlook, but it is most important to the purpose of the planning meeting to help the client see a variety of possible perspectives on the situation or challenge.

The facilitator and client work together to generate a variety of outcomes and obstacles.

The facilitator uses a variety of invitational stems like WIBNI (wouldn't it be nice if) or WIBAI (wouldn't it be awful if) to generate many varied and unusual options.

Select a Direction and Establish Ownership

After assisting the client in examining a variety of perspectives on the challenge, it is important to converge on a preliminary area upon which to develop an appropriate process plan. This direction will be the focus of the CPS session and provide the context or framework to identify data, criteria, and elements for the plan of action.

The client converges on those outcomes and obstacles for which he or she has ownership. The following questions are asked: Does the client have influence? Does the client have interest? Is the client willing and able to use imagination on the task?

The facilitator helps the client to formulate a clear statement of the particular desired future state (broad, brief, and beneficial) for the situation.

The facilitator works with the client to understand that the selected statement describes a general direction to pursue, not a specific statement of the problem. (That happens later in the process.)

Plan to Use Process

After the direction is set and the context is determined, the next step is to develop a specific plan for applying the CPS process. Since CPS is a broad framework, it is necessary to tailor its use within a specific context. An outcome of this meeting (or another meeting, if time does not permit) is a specific plan to brief the resource group on the results which help them understand the client's direction. Although the resource-group members do not necessarily need to be experts, they need to know enough about the context and direction to be helpful. It is important to use the client's expertise on the problem or opportunity to develop the most productive CPS process intervention.

The facilitator provides the client with an overview of the CPS process and its components.

The facilitator working with the client determines and designs the appropriate process agenda.

The facilitator and client work together to determine the appropriate utilization of groups in the process design.

A plan is devised to communicate the results of the session with resource-group participants (memo, video, graphics, samples, etc.).

Plan for Session and Logistics

There are many additional things you can do to increase the likelihood of a productive CPS session. One of the most tangible ways to prepare for the session is to think about the actual physical arrangements for the meeting. This is especially important if you will be using group resources. A convenient way to deal with these concerns is simply hire a meeting planner. If this is not an option for you, please consider the following information.

The facilitator helps the client prepare for the actual session—helping to decide, for instance, when to include the use of audio-visual aids, charts, or pictures.

The facilitator and the client discuss the criteria for group membership and the appropriate limits for diversity of perspectives.

The facilitator coaches the client on the appropriate behaviors for the CPS session.

The facilitator briefs the client on the technology to be used during the session.

Resource-group participants are invited and informed of the purpose, time, and location of the session. The memo may also provide a brief summary of the client's direction, key data, and rationale for using CPS.

The layout of the meeting room arrangements should be conducive to the purpose of the session (so that flipcharts are visible, eye contact with group members is possible, etc.).

Support materials should be arranged (including technique handouts, post-it pads, markers, etc.).

Facilitator and client should establish and agree upon an appropriate time line.

Plan to Debrief the Session

One of the most productive ways to learn from the investment of time, energy and other resources which are used during the CPS session is to plan to capture the key learnings and identify the most and least productive or valuable aspects from the experience. This will be very helpful in the facilitator's future work with that particular client and with many future clients.

Checkpoints for monitoring and evaluating the outcomes of the session should be prearranged between client and facilitator.

Goals for the session should be made explicit in order to determine if the session was a success.

A plan should be developed for handling the output of the session.

The issue of giving feedback to participants should be discussed. If required, a plan to deliver feedback should be developed.

An actual debriefing session should be planned to identify key strengths and areas for improvement.

Tips for Client-Facilitator Meetings

The facilitator should do several things at the client-facilitator planning meeting:

Listen carefully. This is an opportunity to check out the client's perception of the challenge and insure his or her comprehension of the planning process. The client should be encouraged to say back in his or her own words what you are sharing.

Be willing to "just say no." Negotiate the session very carefully. Sometimes the best thing the facilitator can do is identify that CPS is not the most effective approach for the client. It is often helpful to build in some incubation time after the meeting so the facilitator can determine if CPS is appropriate and if he or she is the proper person to facilitate the session.

Make it a real meeting. The meeting should not be sandwiched between two more important meetings or given a lower priority than the typical stream of work that confronts any busy professional. After conducting a few meetings, the facilitator may find it helpful to develop his or her own personal protocol, including a special form to be filled out or a checklist to share with the client. Keep it deliberate and explicit.

Be prepared. Be ready to share some examples of successful sessions and identify what made them work so well. It may also be helpful to have a few worst-case examples to show what can happen if certain aspects of planning are not dealt with successfully and to provide the client a list of references of the actual clients in these examples. (This is another reason for the importance of debriefing and making this kind of arrangement with clients.)

Use a process buddy. It can be very important, especially for the first few times, to ask a more experienced (or equally experienced) facilitator to join the planning meeting. Just having another pair of eyes and ears can help avoid some of the pitfalls and maximize the value of time invested.

Bring support materials. It can be very helpful to distribute some key handouts the facilitator received when learning about CPS. Do not consider this cheating, just excellent evidence of preplanning. Key handouts or graphics can help make a point and keep the meeting on track. Try assembling a personal facilitator survival kit.

General Tips for Managing Clients

There are several things the facilitator can do to insure the effective management of clients:

Keep the ownership where it belongs. Sometimes clients may want to share the actual problem with you. Watch out for the monkey being placed on your back. Although clients can be very desperate and need to use CPS very much, care needs to be taken that they do not use you to "whip the group into shape" or "do the dirty work."

Don't be afraid to call a time-out. If the client presents a false front during the planning meeting and pulls out a few major surprises, the facilitator may need to create the opportunity for an honest revisit of the expectations that were set. Calling a time-out is infinitely better than trying to run the wrong session.

Check the credibility of the client. Almost anyone can present a facade for an hour or so. It may be very helpful to check perceptions with a few savvy insiders prior to the session. The client may play favorites with the selection of the resource group, may be known for certain inappropriate behaviors which one would want to prepare for, or could be known to be uninterested in self-awareness.

Check, check, and recheck ownership. If there is a single most important factor in a successful CPS session, it is that it must be real. If the client has a list of things that would never work, does not appreciate soft science, or has no intention of acting or responding to the outcomes of the session, the facilitator may need to walk away, postpone, or renegotiate.

Stay down to earth. A client can sometimes see one's process expertise as magic and treat the facilitator like a magician. This can often give quite an ego lift. Watch out for playing into this one! Although it may be hard, keep the work in the arena of what is natural, deliberate, and repeatable.[1]

Try to reward good client behavior. In building an effective relationship with the client find opportunities to: say thank you (write thank-you notes, just say thanks, have their boss send thank-you letters or memos, etc.); remember their needs (send them articles or resources as follow-up to the session, practice some networking to connect others to your client, etc.); talk about them to other groups (spread the word about their productivity); drop in for an informal visit to just say "hi."

The Resource Group

The other members of the creative problem-solving group are called participants and they function collectively as the resource group. These group members suggest options and provide a wide range of alternatives during the session. Effective resource-group members show an interest in the client's content but do not make

decisions for the client. They support the decisions the client makes and provide a divergent range of possibilities from which the client can choose. In short, they practice effective listening strategies and find ways to make productive contributions to the problem-solving session.

Resource-group members provide energy, diversity of experience, and a variety of viewpoints. The facilitator's challenge is to capitalize on the group's assets and limit their liabilities by providing the necessary balance of creative and critical thinking processes in meeting the needs of the client. Effective use of CPS requires a dynamic balance between using deferment of judgment to diverge and generate options and using affirmative judgment to converge, analyze, and develop options.

Another major challenge to the facilitator of creative problem-solving sessions is to effectively balance and reinforce the roles of facilitator, client, and resource group. Part of this responsibility includes making these roles explicit for all group members so that everyone knows what is expected of him or her. Although it is beyond the scope of this paper to thoroughly examine the functional roles of group members (see Benne and Sheats, 1948; Isaksen, 1983), these three roles provide the basic interpersonal framework for the facilitation of creative problem solving in groups.

Deciding to Use a Group

Many people who have attempted to use groups for developing novel and useful alternatives find out that it is not always easy, pleasurable, or effective. Using groups has both positive and negative aspects.

In considering whether to use a group for obtaining a better understanding of the situation, generating options, or making a decision, the facilitator needs to pay attention to a number of key factors. These factors include: aspects of group development; the skills and styles of leadership; the roles of client and resource group; group orientation, composition, and size; process technology; and the structure of the environment. In addition, the facilitator may need to consider the required quality of the outcome as well as the needed level of acceptance from group members.

Table 1, describing assets and liabilities of using groups, has been developed by weaving together the work of Maier (1970), Vroom (1974), and Van Gundy (1984):

Table 1. *Potential Assets and Liabilities of Using a Group*

Assets

1. Greater availability of knowledge and information.
2. More opportunities for cross-fertilization, thereby increasing the likelihood of building and improving upon ideas of others.
3. Wider range of experiences and perspectives upon which to draw.
4. Participation and involvement in problem solving increases understanding, acceptance, commitment, and ownership of outcomes.
5. More opportunities for group development, thereby increasing cohesion, communication, and companionship.

Liabilities

1. Social pressure toward uniform thought limits contributions and increases conformity.
2. Group think: Groups converge on options which seem to have greatest agreement, regardless of quality.
3. Dominant individuals influence and exhibit an unequal amount of impact upon outcomes.
4. Individuals are less accountable in groups, thereby allowing groups to make riskier decisions.
5. Conflicting individual biases may cause unproductive levels of competition, leading to "winners" and "losers."

When considering the use of small groups for CPS, the facilitator needs to evaluate the existence of the liabilities and assets. The goal is to maximize the positive aspects of group involvement while minimizing the liabilities. For example, as the facilitator increases the productive use of diversity the likelihood of individual dominance should decrease. In general, if there is a need to provide for participation to increase acceptance, if the information is widely held, if there is a need to build on and synthesize the diverse range of experiences and perspectives, or if it is important to develop and strengthen the group's ability to learn, the facilitator may choose to involve a group in CPS.

Group Development

Once the leader has decided that a group should be created, there are a number of dynamics to consider. One of the first of these is the notion that groups go through certain phases of development (Bales & Strodtbeck, 1951; Lacoursiere, 1980; Tuckman, 1965). Groups are not static. Like individuals, they are unique, dynamic, complex living systems, capable of learning and development. Figure 1 depicts the Jones (1983) model for group development. According to this model, the stages a group goes through while moving toward a desired goal are relatively predictable and controllable. In reality, it is quite clear that these stages are not necessarily linear and sequential. Some groups seem to skip stages, whereas others will approach them in reverse order. Still others will reach a level and need to begin all over again because a new member has joined the group. One of the classic leadership dilemmas is getting the work done while at the same time maintaining positive human relations (see Blake & Mouton, 1964). It is this essential tension which is nicely displayed below within the context of group development.

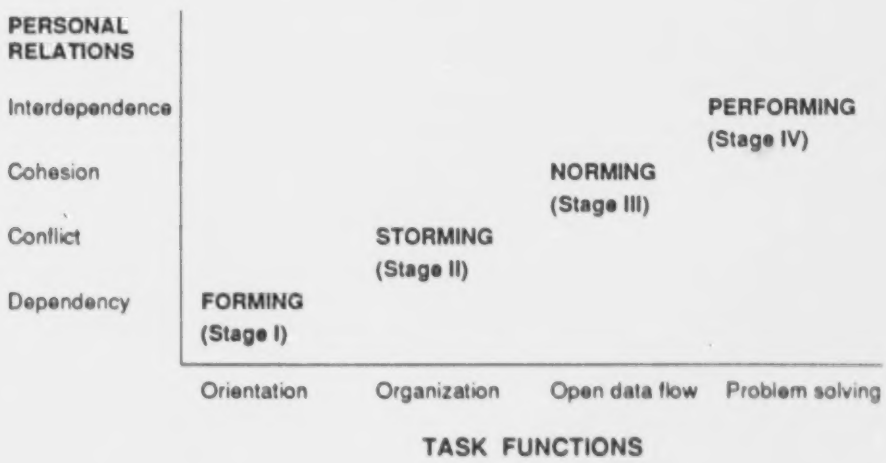

Figure 1. ***A model for group development***

Understanding where groups are and where they should be can be helpful in planning for maximum effectiveness and productivity. The two dimensions of the model are *personal relations* and *task*

functions. In other models these dimensions go by different names, but a number of people involved in group development have identified these two dimensions as being central to the process.

The personal-relations dimension refers to the development of the human side of the activity that occurs in the group. Whether it is a task group or a growth group, people progress in development from individuals to group members, to people who feel some attachment to each other, to, finally, people who are able to link up in creative kinds of ways. Personal relations involve how people feel about each other, how people expect each other to behave, the commitments that people develop to each other, the kinds of assumptions that people make about each other, and the kinds of problems people have in joining forces with each other in order to get work done. The assumption is that the kinds of groups that are referred to here are all organized for the purpose of achieving goals, tasks, production, and so on and that personal relations refers to the human component in the accomplishing of this purpose.

With respect to the dimension—task functions—characteristic behaviors can also be identified in the different stages of group development. A group comes together, learns what the task is, mobilizes to accomplish the task, and does the work. So the two dimensions form a matrix in which there is an interaction between characteristic human relations and task-oriented behaviors at the various stages of group development. Of course, no two-dimensional model can completely subsume all the data of group interaction without a loss of some precision. The purpose of looking at group development in this relatively simplistic way is to underline the importance not only of the two dimensions but also to provide a common language whereby group members can explore the emerging characteristics and parameters of the group.

Stage One: Forming

In the initial stage, forming, personal relations are characterized by dependency, and the major task functions concern orientation. In the beginning of the group's life, the individual members must resolve a number of dependency problems and characteristic behaviors on the personal-relations dimension. They tend to depend on the leader to provide all the structure: The group members depend on the facilitator, chairman, or manager to set the ground rules, establish the agenda, and to do all the "leading." The parallel stage in the task function is the orientation of group members to the work that they are

being asked to do. The issues have to be specified. The nature of the work itself has to be explored so there is a common understanding of what the group has been organized to do. Common behavior at this point is questioning why they are here, what they are supposed to do, how they are going to get it done, and what are their goals?

There are clear implications for the CPS facilitator when the group is at this stage of group development. This is the stage at which the skills associated with training and teaching are critical. The facilitator must take charge long enough to provide a basic orientation for the group and lay out basic ground rules for operating together.

Stage Two: Storming

The second stage is characterized by conflict in the personal-relations dimension and organization in the task-functions dimension. It is referred to as "storming" because interpersonal conflict inevitably ensues as a part of small-group interaction. It may be that the conflict remains hidden but it is there. Each person brings to small-group activity a lot of his or her own unresolved conflicts with regard to authority, dependency, rules, and agenda, and interpersonal conflict occurs as the group organizes to get work done. Who is going to be responsible for what; what are the rules going to be; what are the limits going to be; what is the reward system going to be; what are the criteria going to be? The variety of organizational concerns that emerge reflect interpersonal conflict over leadership structure, power, and authority.

When learning and applying CPS, members of groups will often have different perspectives on the use of techniques or guidelines. Often questions are put forward on the value or appropriateness of CPS. On the one hand, it is important for this type of disagreement or questioning to occur. On the other hand, it must be met with effective answers, explanations, and modeling. The CPS facilitator must be able to respond effectively to this kind of storming. Identifying the three roles, having a good understanding of the needs of the client, and selecting the group members carefully can often pay dividends during this stage of group development. Managing interpersonal tension over options or ideas is critical at this stage. Keeping this kind of tension separate from personal tension, where individuals might attach the person to the idea, is also important. Groups must often be helped through this stage or they will not form into a more cohesive unit capable of high-level performance. This is the stage at which effective application of situational leadership is needed. Members will be done with storming at different times.

Stage Three: Norming

In the third stage, the personal-relations area is marked by cohesion, and the major task function is data-flow. It is during this "norming" stage of development, assuming the group gets this far, that people begin to experience a sense of "groupness," a feeling of clarification at having resolved interpersonal conflict. They begin sharing ideas, feelings, giving feedback to each other, soliciting feedback, exploring actions related to the task, and sharing information related to the task. This becomes a period during which people feel good about what is going on; they feel good about being a part of a group, and there is an emerging openness with regard to task. Sometimes during this stage there is a brief abandonment of the task and a period of play that comes from an enjoyment of the cohesion that is being experienced.

When CPS groups reach this stage it is important for the facilitator to provide some recognition and celebration of the success of the group—something analogous to the feast following the hunt or the song after successfully managing a boat through whitewater. A major challenge for the facilitator is to channel this positive energy onto the client's task. It is often at this stage that facilitators begin to feel the energy and weight of the group, whereas at earlier stages the goal structures were more individualistic and competitive. Now the group may want to cooperate on every task and get hung up when they can't be "all for one and one for all." Maintaining the focus on the CPS process while encouraging the meeting of the client's need is the major task for the facilitator. The challenge is to let the celebration of consensus last long enough to recharge and refocus the group but not too long so as to invest unnecessary energy in managing the group for the group's own sake. CPS groups are not formed necessarily or solely as social support systems.

Stage Four: Performing

The fourth stage is rarely achieved. It is marked by interdependence on the personal-relations dimension and problem solving on the task-functions dimension. Interdependence means that members can work singly, in any subgrouping, or as a total unit. They are both highly task-oriented and highly person-oriented. The activities are marked by both collaboration and functional competition. The group's tasks are well defined, there is high commitment to common activity, and there is support for experimentation and risk-taking.

This is the stage at which the CPS facilitator can push the boundaries on applying the process. In a sense, if the dynamics have been managed well, the CPS framework ought to help more groups get to this stage of development. The performing stage is what really fits the effective application of CPS. This is the stage at which the facilitator's challenge will be more focused on selecting the appropriate techniques to ride the wave as it were. Observing the energy of the group and keeping it focused on the task while understanding the reactions of the client become significant challenges for the facilitator.

It is during the performing stage that individual members are both empowered and aligned. They have a shared vision for why they are together and how they are operating. It is at this point that it is appropriate to use the label *team*. It is important to remember that groups will not stay at this stage forever (nor should they). During the norming process, the group has very probably formed around an implicit set of assumptions. Occasionally, the facilitator will need to test the boundaries or even question their existence.

Applying the Model of Group Development

When applying the model it is important to remember that this is not a static description of how groups develop. In other words, it is highly unlikely that a particular group will work its way through this process in a systematic manner. Groups will continually develop. Each time a new member joins or a new task is introduced, the development process begins anew.

Understanding some of the dynamics and patterns that occur within groups is essential if a leader wants to diagnose and describe the current status of any group; predict what might occur in the future; and provide behavior and influence which might help the group move on to a more productive level of development. For the leader of CPS activity, it is important to provide appropriate leadership strategies to move the group beyond learning basic skills and how the CPS techniques can be organized around components and process. The aim is productively applying these learnings to real challenges and opportunities. Group development combined with an appropriate understanding and application of leadership strategies can help CPS groups reach higher levels of application (Carew, Parisi-Carew, & Blanchard, 1984).

Managing Groups

There are many challenges to the effective management of groups. We have all seen groups that have gone wrong. As a group develops, there are certain aspects or guidelines which might be helpful to keep them on track. Hackman (1990) has identified a number of themes relevant to those who design, lead, and facilitate groups. In examining a variety of organizational work groups, he found some "trip wires" that could lead to major mistakes when managing groups. In addition, from our own experience, we have identified a number of key contingencies to consider when managing CPS groups. These are identified below.

Group Versus Team

One of the mistakes that is often made when managing groups is to call the group a team but to actually treat it as nothing more than a collection of individuals. It is important to be very clear about the underlying goal structure. Organizations are often surprised that teams don't function too well in their environment. Of course, they often fail to examine the essential ingredient of competition in their rating or review process.

If a team is important, then a cooperative goal structure will be more appropriate. The group must be accountable for its outcomes. Reward and recognition systems need to be built around different perspectives. If one wants the benefits of teamwork, then teams must be built and developed.

Ends Versus Means

Managing the source of authority for groups is a delicate balance. Just how much authority can you assign to the team to work out its own issues and challenges? For the CPS facilitator, the authority issue is handled primarily by the charge given by the client. The outcome of the client-facilitator planning meeting ought to be a clear direction for the problem-solving efforts of the group.

The group should not be told exactly the kinds of problem statements to generate or the precise qualities of the ideas to be generated. Group members should be given a clear understanding, however, of the general direction in which the client needs to move. The end, direction, or outer-limit constraints ought to be specified, but the

means to get there ought to be within the authority and responsibility of the group.

Structured Freedom

It is a major mistake to assemble a group of people, tell them in general terms what needs to be accomplished, and let them work out the details. At times, the belief is that if groups are to be creative, they ought not be given any structure. It turns out that most groups would find a little structure quite enabling if it were the right kind. Groups generally need a well-defined task. They need to be composed of an appropriately small number to be manageable but large enough to be diverse, and they need clear limits to the group's authority and responsibility.

In terms of facilitating CPS, the well-defined task can be the result of client-facilitator planning and the preparation of the group to deal effectively with the process technology. We generally recommend that group size be no fewer than five and no more than seven. The extent to which resource-group membership needs to be diverse depends greatly on the nature of the task. Finally, the roles within the group should insure an adequate understanding of the expected behaviors and responsibilities of the group members.

Structures and Systems Supportive of Teamwork

Often, challenging team objectives are set but the organization skimps on support to make that objective a reality. In general, high-performing teams need a reward system which recognizes and reinforces excellent team performance, and they need access to good-quality and adequate information as well as training and educational support. Good team performance is also dependent on having an adequate level of material and financial resources to get the job done.

Assumed Competence

Many organizations have a great deal of faith in their selection systems. Facilitators cannot assume that the group members have all the competence they need to work effectively as a team. Often it has been a technical set of skills and abilities which has put someone in a position for inclusion within a CPS group. Members will undoubtedly need explicit coaching on the skills that they will need to work well in

the team. Coaching and other support interventions are best done during the launch, a natural break in the the task, or at the end of a performance or review period. It appears that the start-up phase is probably the most important time frame to provide the necessary coaching or training.

Group Orientation

All group members need to have some basic information about what they are expected to do. Agreement is necessary on the procedures and methods that will be used for group activity. It is also very helpful for group members to be aware of their strengths and limitations in using various process technologies, as well as the kinds of personal and situational blocks to creative thinking which may surface during the session.

Composition

Some deliberate decisions need to be made about the number and type of human resources that will be a part of the session. Heterogeneity of perspectives and experiences as well as homogeneity of levels of power should be considered. Generally, CPS groups should be informed of the criteria used in member selection.

Group Size

Depending on the purposes of the session, a specific number of participants should be specified (generally five to seven). Larger groups should have additional facilitators to allow an equivalent ratio. The facilitator may also want to consider the levels of expertise necessary in dealing with the client's task in order to insure that there will be adequate input and deliberation during the planning meetings prior to group sessions.

The Structure of the Environment

The climate or environment within which the task occurs must be conducive to creativity. Group members need to have a certain degree of trust and safety to make contributions and engage in open communication. The facilitator has a special challenge to establish a

social climate which is characterized by psychological safety and thus encourages the participants to develop an internal or intrapersonal climate that can overcome barriers to effective problem solving.

Some attention must be focused on assuring that the necessary equipment and resources are assembled for the session. This means setting up visuals and making sure that there will be flipcharts available with plenty of paper and markers, and that there will be a means for affixing these papers in a prominent place for all to see. In addition, the group should be assembled in a place where it is possible to be comfortable to share ideas and engage in effective communication.

The purpose of the session, as well as the amount of time to be scheduled, should be explicitly identified for all group members. Is the purpose of the group meeting to identify the initial statement of the problem, to generate ideas, or to develop and evaluate options? A specific process task should be identified and an appropriate amount of time should be set aside for the accomplishment of that task.

The environment may provide some indications about the level of quality needed for the decision, as well as the level of acceptance required for implementation. If the leader lacks the necessary information and other group members have that information, the leader can increase the quality of the outcome by involving the group. The same is true if the leader does not know what type of information is required or where it is located.

Involving group members in problem-solving sessions that affect them increases acceptance of the outcome or solution. The facilitator who can analyze environmental considerations to structure the appropriate climate can be assured of a greater degree of success in utilizing group resources.

Getting Started with CPS

When the facilitator is planning to apply CPS with a group, it may be helpful to consider the aspects of orientation, outlook, outcomes and obstacles, and ownership. Before jumping onto any process design for creative problem solving, we have found it useful to work through some fundamental issues on the front end of the process. This is often handled during the client-facilitator planning meeting but can also be approached in other ways.

Before actually applying the techniques within the context of the client it may be worthwhile to understand the orientation of the individuals within the group. Understanding the creative thinking and problem-solving abilities and skills of the client as well as the resource-group members can help in planning the amount of time for

basic preparation before actually engaging in problem-solving processes. Having the opportunity to determine the styles of creativity, decision making, or problem solving of the group members can also be fruitful in managing and appreciating differences in how people will approach the task and process. Determining the levels of expertise of the client and resource-group members provides an indication of whether the facilitator will need to spend time and energy on data-gathering and information search before, during, and after group interaction. Finally, providing all group members some information about their barriers to effective problem solving can help the group manage around them.

It will also be productive to get some idea about the outlook of the client before engaging in CPS. It is possible to determine the view of the culture which is operating within the current context of the problem-solving efforts. Having the client use hindsight to describe the culture or key past experiences which may be related to the current situation can give you some idea about the broad context within which the client will need to operate. It may also be helpful to assess the current personal perception of the climate within which the client and resource-group members operate. The current view of the situation or prevailing trends may be different from the view of the past culture. Ultimately, the facilitator needs to determine the client's vision of the desired future state for the situation. This foresight will help determine the process strategies to employ and the kind of approach to take.

It is sometimes useful to ask the client and resource-group members to generate a variety of statements which describe the desired outcomes and the obstacles to be avoided or overcome. When stating these one should keep them broad, brief, and focused on benefits. If a group is generating these it is possible to collect a wide variety of statements within a short time. This could provide the client a rich array of different perspectives on the concern or challenge.

Before actually engaging the group in CPS, the facilitator must consider the level of ownership on the challenge or concern. Is there a single client or is the challenge owned by many clients? Influence, interest, and room for imagination must be present, and elements of the client's task must be specified and have clear connection to the responsibilities of the real owner.

Conclusions

This paper has presented some key considerations for facilitators interested in effective utilization of group resources during creative

problem solving. It is intended, however, as only a beginning point in the effort to identify the various aspects of group-oriented leadership for creative problem-solving groups. Facilitating CPS is an activity which can draw upon the knowledge and expertise of a wide array of disciplines and areas of work. The challenges of facilitating CPS deal with a new frontier of human understanding: how we use the human imagination to improve the quality of our existence.

General Suggestions for Applying CPS

There are many opportunities to learn about the effective facilitation of CPS. There are also some "trip wires" to avoid and some suggestions which might be productive. One of the first things to avoid is calling the group together and identifying them as a "problem-solving team" but failing to adequately distinguish the members' special roles and responsibilities to the group. Group leaders need to encourage team members to accept responsibility and accountability for their roles and tasks. The CPS facilitator does this by ensuring real clientship for tasks on which the group works. Also, the facilitator must not assume that all group members understand all that they need to know about their roles and the process procedures to be employed. Some deliberate time and energy must be invested in teaching the participants their roles and a few basic process guidelines and techniques. Organizations that demonstrate the effective application of CPS usually have a strong emphasis on learning.

The following suggestions may be helpful for those who attempt to facilitate CPS sessions after learning some basic approaches and techniques.

Use the techniques personally. A facilitator must be convinced of the value and effectiveness of the techniques and should use them him- or herself. People who go out and practice the use of the tools usually feel more confident in them and are more effective at sharing with their colleagues. It really helps a facilitator to have a variety of personal experiences from which to draw!

Demonstrate benefits. It is helpful if the facilitator is able to document the benefits of using methods and techniques which add value to the team, team members, and the organization. A participant who was able to record the cost savings on her job was able to attend more training sessions paid for by the management.

Use the techniques soon after training. Many people have reported that it was helpful for them to use the CPS tools soon after the training experience while their memories are still fresh.

Continue learning. Usually, courses in CPS are very brief in duration—compared with an entire semester or program of structured learning, which can last a few years. Such programs are good opportunities for general exposure and some limited application. It makes sense to continue learning through reading, additional courses, and personal study.

Debrief your use of CPS. Many facilitators of CPS use a process journal or notebook in which they make notes about their learning and application. They are able to review their progress and clarify their learning accomplishments and needs. They are able to consider the things they seem to be doing well and the questions they have for self improvement.

Use process flexibly. Although CPS can be seen as a general system which contains three components and six stages, the most appropriate use of it is flexible and dynamic. Those who search for the opportunity to use all three components and all six stages may never find the perfect chance to use the CPS process. CPS is designed to be personally helpful in meeting challenges, attaining goals, and overcoming problems. Perhaps it may only be necessary to use one technique with a group; or even to use the tool personally and share only the outcomes with the group.

Use on low-risk challenge. Many people have reported that it was helpful to initially try using CPS on something that was not a life-or-death situation. This made it possible for them to be playful and explorative, which enhanced the subsequent application of what they learned.

Integrate its use. It is important to weave CPS tools into the work that one does. Rather than establish a special learning or application situation, it seems to be important to use CPS on everyday challenges and tasks. This is an effective way to show how CPS relates to real business or organizational needs.

Find a sponsor. It can be helpful to identify someone who is really interested in improved productivity (or for that matter anyone in a position of providing support who is dissatisfied with the current reality). Offering the application of CPS on something this sponsor wants to change or improve can be very helpful in gaining support for the use of this tool.

Find a safe group. Many people have pointed out the value of having a small group of people they work with who were personally supportive as they initially attempted to use CPS strategies. Sometimes it was a matter of offering to share a technique with this group and then experiencing a small degree of success that made the difference!

Team up. Many people have been trained in CPS. One may find support by teaming up with alumni of this course or facilitators or others in the network of those who know and use CPS. Having someone else in the group who knows the language and can offer support can increase the effectiveness and learning of the facilitator.

Use outside experts. It can be helpful to bring in a few outsiders to get the ball rolling. These people, just because they come from somewhere else, seem to offer a low-risk way to get some attention focused on using CPS and may thus "prime the pump."

Note

[1]Once I conducted training in a tall observation tower. A storm began to develop while I was explaining that creative products and ideas can vary in scope and impact. An idea that produces a small, incremental improvement could be considered a level-one creative idea. An invention that leads to a radical revision of an industry might be a level-five creative product. I added that I reserved the number ten for God's creativity. At that moment lightning flashed and thunder rocked the room. A few members of the group asked if I could do that again. I resisted the impulse to try.

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Scott, while coming out of the Buffalo tradition of creativity training (which traces its roots to its founders, Alex Osborn and Sid Parnes), has begun to make his own impact on this field with an emphasis on research and a more encompassing macro-model of the creative problem-solving process. Scott has earned his wings in several long-term projects with companies which ask the tough questions: Does this matter? How can creativity make a real difference?

Even though Scott continues to produce fine graduate students who carry his message further, he also serves as a stimulus and professional role model for his creativity colleagues both in his department and elsewhere. In addition, he runs a busy private consulting practice, CPS-B, *to serve others with needs in creative problem solving.*

Scott received his Ed.D. from the University of Buffalo in 1983. ***SSG.***

PART TWO

Practice

Establishing a Corporate Environment for Stimulating Innovation

K. Larry Hastie

Over the last few years there has been an increasing concern that the United States is losing its position as the world's technological leader. As foreign companies increase their share of the U.S. and world market, many companies have started to question their own innovative capabilities and wonder what they can do about it.

In most manufacturing companies, technical innovation is one of the most important determinants of a company's long-term success. It is a process by which someone identifies an idea, translates that idea into a process or product, and modifies that process or product until it is a commercial success in the marketplace. Without new and better products or processes, a company's future will not be bright. Technical innovation is not just inventing or writing a patent, even though they are important ingredients to innovation.

There are many ways in which a company can encourage or discourage technical innovation. Unfortunately, many executives are doing little to understand whether and how their companies are discouraging innovation.

If technical innovation is important to a company, there is no reason management cannot reemphasize its dedication to it and its commitment to stimulating it. Innovation can be planned, encouraged, and improved. The creative talents in many people are latent abilities that can be tapped and revitalized even after many years of misuse. The atmosphere must be established by the chief executive. There is no single way, unfortunately, to stimulate innovation. Rather, a number of seemingly small but important changes may be required. Usually, they do not involve spending money but changing practices and behaviors. In this paper I will discuss some general problems of innovation in companies and will recommend specific actions to correct these problems. Innovation may be one of the untapped sources of potential in your company. Have you allowed innovation to flourish or does it lie dormant?

There are two aspects to stimulating or restimulating innovation in an organization. The first is assessing the innovative environment: Do you have a problem? What really is the source of the problem? The

second is acting upon these assessments, and we have noted three important kinds of action: expressing corporate management's desire for innovation; nurturing the innovator; and managing the innovative process.

Assessing the Innovative Environment

While committees are not always the best way to run a company, they can be very useful in assessing the innovative environment and determining what can be done to improve it. The first step is to determine whether there is a problem. One way to understand whether there is a problem is to establish an ad hoc self-destructing committee to investigate the issue.

The Bendix Corporation did this and a number of other companies have as well. In general it should be led by someone who has the trust and confidence of the company chairman and who is not afraid to tread on others' toes. In some cases it might be useful to have someone lead it from outside the technical community. The chief technical officer, however, should be on the committee, as well as individuals from the patent, research, and human resources departments. Various individuals from line operations must also be included, such as a group executive, a general manager, and perhaps someone from marketing. It is important to have a mixture of functional disciplines and line/staff responsibilities included.

If such a committee is formed, one of the first things its chairman must do is bring the committee members to a common level of understanding of what has happened in the past in the area of technical innovation and what is happening now. It is useful to define what technical innovation is and talk about what it means to the company. What have the research laboratories and engineering departments already been doing? What are the policies and procedures in the patent area? What existing award and compensation system is in place today?

The next step is to solicit ideas from employees throughout the company. Most companies have very talented individuals with opinions on how technical innovation can be stimulated and what practices, policies and behaviors inhibit innovation. Do not underestimate the ideas and inputs these people can provide.

Some companies have found it effective to solicit letters from employees and then have a selected number of these letter writers make presentations to the committee. Some have sought the counsel of outside consultants to provide an added perspective on the suggestions and to relate the experiences of other companies. Notice, however, it is

not recommended that the whole task be assigned to an outside consultant. Bendix found it beneficial to invite the following: (1) a selected group of the memo writers, (2) individuals who had received technical achievement awards from the company in the past, (3) a group executive, and (4) retirees who had been involved with the company during its highly innovative years. In this situation, the invitees made presentations, listened to the other presentations, and had an opportunity to make additional comments. These sessions were highly informative and useful to the committee.

While it is not necessary to establish a committee to study the technical innovation issue, most companies have found this effective. The advantage of the ad hoc committee is that you can involve key individuals for a short time and assure that you get recommendations from a broad base of the company rather than the opinions of a small number of employees who may have vested interests. Also, an internal committee enhances the likelihood of acceptance of any recommendations.

There are no simple or magic answers to difficult questions such as, "How can we stimulate technical innovation within our organization?" The answers rest in a multitude of specific recommendations which involve all levels of management. The tone, however, must be set by senior management. To do it right you must establish a creative and innovative culture within the company. This culture can be created even though the company is diverse and technical innovation is only the responsibility of a small, but an important, percentage of the employees. Technical innovation is one aspect of an overall corporate demand for creativity from all employees. For engineers and scientists this creativity comes in the form of technical innovation or process improvement. In other employees it comes from doing the job more effectively or developing cost-saving or profit-generating ideas. Although most of these thoughts are directed at the engineering or technical functions, many of the recommendations can apply to stimulating innovation and creativity in other areas—whether it be finance, marketing, personnel, or planning.

Expressing Corporate Management's Desire for Innovation

The direction of a company is basically set by the priorities and emphasis that corporate management places on various issues. In recent years many companies have emphasized areas such as EEO, health and safety, and strategic planning that had once been largely neglected. Improvements in these areas were integrated into goals and objectives of the employees. Managers who did not share in the de-

mand for improvement in these areas were reeducated or reassigned. On the other hand, technical innovation has not been demanded from general managers.

Over the last decade many companies have not placed a high priority on technical innovation or new product development. This can be widely felt throughout the company—at the general-manager, director-of-engineering, and engineer levels. Although no one has ever said, "We do not want innovation," a lack of support has been reinforced through various management acts of commission or omission over the recent past.

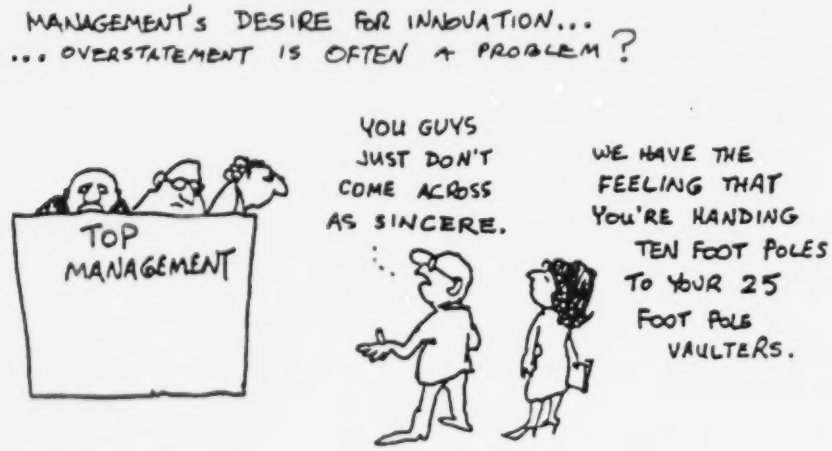
Although senior corporate management talks about the future with group management, the pressure felt by general managers and engineering directors is to solve this month's problem or make this year's budget. Phone calls ask, "Why are you below your budget?" or, "Can we get another $100K profit this quarter?" Pressure is always for short-range rather than long-range results.

If innovation is to be stressed in a company, its importance must be highlighted and reinforced by the actions of top corporate management. Simply expressing an interest or firing off a corporate-wide communication is not only not enough but may be counterproductive, considering the attitudes found at lower levels in many companies. Top management must appear interested in a convincing and forceful way.

In expressing management's desire for innovation, corporate and operating management must be careful not to overreact, overpromise change, or overstimulate peoples' expectations. Any reemphasis must be carefully portrayed to avoid inappropriate expectations by lower levels within the company for obtaining money for a favorite project or being allowed unscheduled time to be creative. Because of the perceived short-term priorities of management in the past, because of the continuing need to make this year's budget, and because of the noninnovative orientation of many managers and supervisors, all levels within a business segment must be moved in the same direction at the same time with respect to stimulating technical innovation. Since some units should and must move more quickly than others, the tone must be established by group and division management.

The company must also be willing to make controlled compromises in its near-term financial performance. Those who have visibility into the top of the corporation know that this is being done today. Unfortunately, there is not visibility or belief that this is so at the levels of the company where innovation begins. It is important for executives to be seen as willing, across the company, to make controlled compromise of its near-term financial results in order to assure its technical position, its innovative position, and its future.

Another issue that is usually important is the willingness of the company to accept risk and failure. The perception usually exists in companies that they are not tolerant of risk and do not understand justified failure. Corporate management, but more importantly operating management, must create an environment which encourages risk commensurate with potential gain, and it must be willing to accept failure. Management of speculative ventures must be measured on aggregate results—not on individual endeavors.


MANAGEMENT'S DESIRE FOR INNOVATION...
... OVERSTATEMENT IS OFTEN A PROBLEM?
TOP MANAGEMENT
YOU GUYS JUST DON'T COME ACROSS AS SINCERE.
WE HAVE THE FEELING THAT YOU'RE HANDING TEN FOOT POLES TO YOUR 25 FOOT POLE VAULTERS.

Recommendations:

Top management should set the tone for stimulating technical innovation but not decree it or establish specific centralized policies or procedures. In many companies the tone should be to "reemphasize" technical innovation, not to have a fundamental change. In other companies the tone may be more "fundamental change" oriented.

Top management must do more to stimulate technical innovation. Top management must ask for technical innovation, demand it, encourage it, stimulate it, fund it, reward it, and—last but not least—accept the risk.

Technical innovation must get top management attention and time in proportion to the importance management attaches to it. Technical innovation should be discussed in operating reviews and in budget and planning reviews. Actions speak louder than words.

Technical planning, seed money, advancing the state of the art, technical innovation, and *invention* must become as commonplace in the management vocabulary as *budgets, PBT, ROI, ROE, EEO, human resources plans,* etc.

The general managers must be charged with the responsibility for technical innovation and new-product development. In many

instances the general manager does not perceive it as his or her responsibility.

"Stimulating technical innovation" or "investing in the future" should be established as a key issue in evaluating general managers and group executives and should be formalized into the performance-review process.

Top management should convey the understanding that the company is willing to compromise—in a controlled manner—short-term financial results in order to invest in the company's future. This willingness must be felt at the levels in the company where innovation begins.

Corporate and operating management must reflect an understanding that increased investing in higher risk ventures to achieve greater returns will result in some unsuccessful ventures. If such unsuccessful ventures are well conducted, they should not penalize those involved.

Corporate and group management should identify certain businesses needing major technical innovation and be willing to invest to develop them. The senior technical staff should identify existing or latent innovators and, where appropriate, encourage relocation to areas of strategic significance to the company.

When the financial health of the company requires strict economies, one must exercise particular care in reducing innovative technology because of the long rebuilding and remotivating period required. More aggressive actions should be taken to reduce expenses in areas that can be rebuilt quickly.

Nurturing the Innovator

After corporate management has expressed the need for more technical innovation, there are several factors that must be considered before starting to manage the innovative process on a day-to-day basis. These factors deal with allowing the time, money, and physical support to innovate. In addition, the company must allow individuals who excel in technical innovation but not management to receive proper rewards and recognition.

Time to Innovate

Because many companies emphasize meeting the budget and fighting current challenges, the engineer's energies are directed at

current problems. Engineers are overloaded with projects pertaining to today's business activities. There is precious little time for free thinking because of these pressures. This sends a message to engineers that management does not want innovation. Frequently, when time is planned for innovation, some of the better people are pulled off to work on urgent current problems. As a result, engineers tend to take time-proven approaches to product design and stay away from the more innovative approaches.

To modify this emphasis and to revitalize the creative, innovative talents that rest in the engineering staff, the company must emphasize the fact that innovation is a necessary part of any successful business. You must give the engineers the tools to be successful, and probably the most important tool is time. Work time must be scheduled for thinking. This is not necessarily the same as blue-sky thinking. Innovators should have deadlines and time pressures just like everyone else. Creative thinking and deadlines are not inconsistent. The more creative engineers must be encouraged to try the alternative, more innovative approach. They must be relieved of some of the day-to-day problem solving and be allowed to develop new and unique ways of meeting market needs. This will necessitate a less structured environment for these select few individuals—one that should not have to be justified financially. But one thing is very clear: If time is not made available, the seeds of new ideas can never be planted for future growth and harvesting.

Recommendations:

Time must be allocated for technical innovation.

Each division should develop its own approach to allocating time for innovation to its more creative engineers, who would otherwise be solving current problems. Not everyone should be given "innovative time."

Work time should be allocated for preparation of invention disclosures and review of patent applications. Many companies inappropriately encourage this work to be done during off-hours.

Seed Money

It is clear that you only get what you ask and pay for. If a company demands innovation—which it must if it's to be viable in the future—then it must be willing to pay for it. Seed money is fundamentally risky funding, the financial justification for which cannot always be measured at the time of allocation. This is not to say that the potential values of ideas cannot be measured and quantified, for they

can and must be; all ideas should not be pursued. It must be recognized, however, that the probability of success for innovative projects will be small and that the financial justification for the total budget must be measured against the few successful ideas that will result. Failure of an idea must not be looked down upon but must be accepted as a normal outcome for this type of investment. Engineers must be encouraged to recognize and admit failure early, so additional funds are not wasted. A critical part of the whole approach is a highly controlled monitoring system—not necessarily paperwork—that will try most reasonable ideas but cut them off when they do not develop as projected.

Seed monies should be identified in division engineering budgets, and the red tape associated with such funds should be kept to a minimum or engineers will shy away. Financial analysis and justification cannot and should not be required for creative-idea development. Each idea must be evaluated on its technical merit and business potential. Small amounts of money should be relatively easy for the engineer to capture, and the control of these funds should be kept within the division or engineering department.

There should also be a group- or corporate-level fund for ideas that are too far-thinking, are not relevant to the originating division, or require too much money for any one division to handle. Once the seed of the idea is nurtured to the point where success can be predicted, the project should be transferred to the division wherein the product will eventually be manufactured and sold.

Recommendations:

Seed money should be identified in the division budgets.

Division and group management should be responsible for evaluating seed-money expenditures. The chief technical officer of the company should oversee the total program to ensure its use and effectiveness.

The approval mechanism for seed money for specific projects in a division should be kept simple.

Group and corporate seed money should be established in addition to divisional funds to cover three cases: (1) The division approves the project but divisional funds are inadequate to cover expected costs. (2) The project is meritorious but the benefits are expected to accrue to another division. (3) The division rejects the project but the next higher level of review approves it.

Management should appoint corporate technical ombudsmen to provide a route of appeal for ideas which are turned down by an innovator's management or which lie outside the scope of the innovator's division.

Physical Environment

Engineering departments in many companies are laid out in an open, bullpen configuration. This leads to a design area full of distractions and noise, which the engineers complain is not conducive to creative thinking. Engineers are located close together, with few or no partitions separating them. Paging systems, telephones, traffic, and overall office noise constantly distract the engineers during their day-to-day work. Such a layout is an efficient use of floor space but is not conducive to creative thinking.

In addition, the private or semiprivate office space that is available is usually assigned to the older, more senior engineers or to the managing engineers. These are not necessarily the most creative engineers. Much of the innovative talent of a company lies with the young engineering work force. Emphasis should be placed on establishing a clean and pleasant working environment, which minimizes noise, traffic, and other distractions. Where particular engineers or groups of engineers have been identified as the most creative people, serious consideration should be given to placing them in separate office space. These areas should be free of all distractions, including music, telephone, office-traffic noise, typewriters, etc.

In addition to the immediate working environment, updated working areas and equipment with modern technology should be provided. Engineers should have the latest and most efficient tools with which to develop and implement their new thoughts and innovative ideas. Greater and facilitative use of computers should be stressed, emphasizing the need for engineers to think rather than manipulate. If developmental facilities are inadequate, a spiraling down of efficiency occurs as a result of manpower waste and frustration.

Recommendations:

Each division should study its quality of workplace and make recommendations for capital improvements that will improve comfort and reduce distractions for all engineers.

A new layout or partitioning of the office area should be considered for the more creative people.

Each division should reassess whether adequate test equipment and computation aids are being provided.

Support Personnel

Over the past few years, many companies have reduced the number of support personnel per engineer. This was done for economic

reasons. These support people include clerical, material-expediter, designer, drafting, technician, and model-shop personnel. Since many of these functions are in the overhead as indirect charges, they are the first to be reduced during budget-cutting time. As a result, many companies have an engineering work force with reduced support staff, which forces the engineer to do nondesign, nonengineering tasks. This frequently reduces the amount of time an engineer has for innovative thinking since he is performing other supportive tasks.

With today's tremendous need for engineering personnel, it is becoming more important to find ways to improve the efficiency of their workday. One way to improve this efficiency is to add support personnel to the work force to free engineers from routine chores and allow them to concentrate on more creative tasks. Additional clerical and expediting staff should be considered also. This will tend to keep the engineers at their desks and in their labs working on the more difficult design problems.

Recommendations:

In light of the current engineering shortage, consideration should be given to adding additional support personnel to allow engineers to devote their time to creative engineering instead of semitechnical work or administrative duties.

To avoid unnecessary head-count increases, management should consider reassigning less effective engineers and replacing them with appropriate support staff. In other cases, less innovative and effective engineers could be downgraded to do nondesign, nonengineering support work.

Dual Ladder

In many companies, outstanding technical people have found it necessary to follow the management route to find financial rewards and stature. This has forced many good performers out of the area in which they excel—technical innovation—into an area where their performance is not as good—management. This movement destroys a good innovator and can create a bad manager.

At a time when good, innovative talent is at a premium, companies should find ways to encourage their engineers to stay with the technical field.

Many companies have developed a dual ladder approach to compensation which allows some technical people to receive higher salaries and more perks than their supervisors. This means, in essence, equal pay and perks for equal importance independent of your

title. The dual-ladder concept recognizes this and rewards outstanding people in both walks of business life.

Encouraging a company's creative talent to stay technical can succeed only if the desires of the person are satisfied. Pure technical achievements and importance are hard to measure and at times difficult to recognize. There is an old myth that engineers are not motivated by pay, financial rewards, and recognition. This is simply not true. They are very much interested in being well paid and rewarded—especially relative to the individuals they view as peers. More often than not, however, the creative engineer will not say or admit that money or status are important. This engineer would rather look on compensation as a family comfort factor.

If the dual ladder does not exist in reality, what suffers is the effectiveness of the individual who is now distracted by what is viewed as a lack of parity with his peers, particularly those in management. This engineer will either be less productive, will opt to enter management, or will leave the company.

In helping to make the dual ladder a reality, corporate management must be aware of the built-in resistance of managers and directors of engineering to the promotion of individuals under their supervision to positions that pay more than their own. How would you like someone reporting to you to be paid more and accorded more status than you yourself? We must educate our managers to recognize that such a person can be a real asset and is not a threat. Corporate management must also be actively involved in making sure the dual ladder is used.

Recommendations:

Job descriptions, pay grades, and salaries should be restructured by the human resources department to allow outstanding technical-staff personnel to achieve or exceed the director of engineering level.

General managers should review their organizational structures to ensure that there is a valid career path for development of technical specialists. Steps must be taken to make the dual ladder work. Talented technical people must perceive that there is a nonmanagerial route for advancement in the company.

The process of identifying "key individual contributors" in divisional human resource plans should be established and refined, with special emphasis on innovators. As part of the chairman's annual executive human-resource review with each group president, the top five or so technical innovators should be reviewed, providing them with the same visibility as general managers.

Outstanding technical specialists should be accorded appropriate nonmonetary perquisites and participation opportunities: placement

on division mailing lists; offices; parking spaces; participation in budget planning and operating reviews; and the like.

Outstanding technical individuals should be considered for bonuses where they have made bottom-line contributions.

Awards

Are company awards for inventions and technical excellence important to innovation? If so, should they be increased? The issue of awards was one of the most frequently mentioned subjects of the engineers who wrote the Bendix committee. These awards can be both financial and nonfinancial. While the participants all agree that nonfinancial awards are needed and should be increased, the views on the value of financial awards ranged from "they make no difference" to "they are crucial." After much discussion the Bendix committee concluded that although financial awards are important to the inventor, they are probably not as important as is nonfinancial recognition.

To be precise, financial awards satisfy and are important to innovation but they are not sufficient to produce it. After-the-fact awards are not necessarily good motivators. Furthermore, care must be taken not to overemphasize financial awards for inventions since if they become too large they may encourage secrecy among coworkers, lead to proliferation of nonmeritorious invention disclosures, or cause jealousy among employees.

Nonfinancial awards are consistently mentioned as important by innovators. The stimulation of the psyche plays an important part in motivating innovation for technical individuals and especially for inventors.

Recommendations:

Management should review its present technical award system to insure that financial award levels are appropriate. This might include meritorious invention disclosure awards, application filing awards, and any corporate technical achievement awards.

Do not adopt profit-sharing on new-product development. These are theoretically desirable but the administrative and fairness problems are in practice too great.

The company should put more visibility behind the existing innovation award programs, specifically including space in the annual report and other major corporate publications and presentation of awards by senior management.

The corporate communications department should add technical topics to the quarterly shareholder reports as well as a column publi-

cizing the employees who have received technical, patent, and profitability awards.

Inventors should be honored at the annual engineering conference.

Press releases concerning patentees should be issued to local newspapers.

Continuing Education

As might be expected, most advanced-degree interest is concentrated in those individuals who have been out of school less than ten years. Some suggest, however, that it is those individuals who have been out of school more than ten years who really need the advanced work. In either respect, many talented engineers feel that they are discouraged from taking advanced-degree work. The major factor in the discouragement is the degree of time pressure on people, caused by the minimum-staff/maximum-work approach associated with a company's emphasis on short-term results.

Recommendations:

The personnel department should review company-funded continuing-education programs to insure that they are being utilized by the appropriate people and that sufficient awards, rewards, or promotions are received by the participants.

The chief technical officer and the human resources department should work together to develop technical courses or find courses offered elsewhere that are tailored to mid-career engineers.

Divisional managers should identify highly talented engineers whose benefit to the company would be enhanced by a leave of absence for supplemental advanced-degree work.

Managing the Innovative Process

Changes in Supervisory Attitude

Innovators in large companies frequently perceive an atmosphere (reflected by divisional management and supervisors) of unwillingness to encourage risk, lack of tolerance for failure, a rigidly structured environment, or lack of desire for new ideas. The closer to first-line supervision, the stronger these perceptions are held. Consequently, the creative people in the company will not be effective inno-

vators, regardless of what management says, unless these attitudes are changed.

Most supervisors in engineering areas plan the work of their subordinates closely. This has resulted in a supervisor attitude that suggests, "Keep your nose to the grindstone and get the work done on schedule." The innovator perceives this and feels there is no time for the generation of new ideas because the supervisor is unwilling to encourage risk—risk that the time and money spent will reap no benefit. Moreover, the supervisor may believe that failure will reflect poorly on him or her personally.

In contemplating ways of modifying these attitudes, senior management must remind itself of several factors. Whereas these attitudes may be relatively easy to modify at the level of the director and perhaps even at the level of the engineering manager, the closer one gets to first-line supervision in engineering, the more difficult it will be to modify the attitude. Since it took a significant length of time for supervisors to gain this point of view, one should expect that it will take a significant length of time to alter it. The creative people in the company are likely to be suspicious of any new discussion relative to free time, a desire for new ideas, a willingness to encourage risk, and a tolerance for those projects that fail. All levels of management supervision must be encouraged and motivated to change attitudes at the same time; first-line supervisors cannot follow several years later.

Most supervisors in the engineering discipline have had little managerial training and have achieved their supervisory positions based on being good engineers. Consequently, they tend to act the way engineers always have acted in their new jobs. This leaves them very task-oriented and very likely to have little consideration for what it is that actually motivates people's behavior. It will be necessary to do significant training. First, supervisors must be trained how to manage in a different atmosphere. Second, they must be given specific training in stimulating creativity.

Recommendations:

The human resources department, with the help of the engineering function, should initiate a broad program to educate supervisors to cultivate, motivate, and champion innovation within their organization.

Engineering supervisors should be made responsible for improving attitudes that stimulate innovation. Their performance evaluations should consider this.

All engineering supervisors and managers who have not attended a creativity session should do so.

Communicating the Needs

Many technical contributors in companies do not understand the direction of their division or have any idea of corporate plans or strategies or know what in fact the market needs. In most companies strategic plans and business plans have been kept secret and the plans and strategies have been influenced more by marketing, pricing, and customer factors than by technical approaches. This puts the creative engineering talent in the position of either working in a vacuum and possibly developing unusable answers or not working on any innovative approach because of frustration. Therefore, not communicating the needs for innovation helps create an environment that stifles it.

Although engineers may not be able to invent exactly what is needed or to innovate in a particular area where innovation is needed, talented and creative engineers may suggest alternative approaches to solving the problem if they are involved in the formulation of the plan. Companies must make the select, innovative, and talented engineer feel a part of the business. This will not happen simply by involving the director of engineering in appropriate staff meetings where the business plan is put together. Individuals that are high on the non-managerial side of the dual ladder must be more actively involved in the strategy process. This should free the company's creative engineering talent from working in a vacuum and from either developing unusable answers when no problem exists or not working on anything new at all because of frustration caused by lack of knowledge of what's going on in the company.

Recommendations:

Selected creative engineers should be involved in divisional strategic planning processes.

Selected technical contributors should be included as senior members of management in strategy and budget reviews.

Management must expand the communication of business plans, strategies, and needs to a much broader segment of divisional personnel, especially including the creative engineering personnel.

Technology planning should be given more emphasis in the long-range planning process.

Education in Creativity

Although some individuals in engineering have participated in creativity seminars, the practice has not been prevalent throughout most companies. Therefore, some engineers and supervisors are at different levels with respect to their knowledge of how to stimulate

creative work. There is some doubt about whether creativity can in fact be taught, but there is universal agreement that it can be stimulated and perhaps encouraged by altering traditional thinking processes. Since supervisors have been told to emphasize maximum efficiency in terms of utilization of personnel and financial resources, little attention has been given to techniques for stimulating creativity. There are several worthwhile programs available which will help companies train selected key engineers and most supervisors on how to make creativity happen.

Recommendations:

The human-resources and engineering departments should work together to identify programs and techniques for stimulating and improving creativity in engineers.

Training departments in large companies should be requested to develop certain "core" creativity programs for all parts of the company.

Communication Among the Innovators

Most innovators seem to agree that there is a great deal to be gained from cross-fertilization among creative people. This cross-fertilization stimulates the flow of ideas which can lead to the formulation of strategies for problem solution. There seems to be a need or at least a very strong desire on the part of company innovators for communication of technical needs and achievements across divisional boundaries. Many innovators are ignorant not only of other corporate work but even of peers who are engaged in related or similar work.

In addition to conveying information, communication among innovators will tend to dissolve the "not invented here" barriers that exist throughout the company. It may be wise to experiment for several years in seeking to build a community of innovative interest and a team attitude among these people.

Recommendations:

Management should establish corporate-technical specialist identification programs, including gatekeeper and consultant listings.

Corporate management should establish a corporate technology council—chaired by the chief technical officer and including respected, knowledgeable innovators and specialists drawn from across the company—to evaluate ideas, people, and proposed technical programs. The council should meet periodically to evaluate the innovative output of divisions and to organize corporate technology interchange seminars.

The chief technical officer should create a corporate technical newsletter to convey stated technical needs, describe useful technical

advances, publicize innovators, and illustrate the value of information exchange.

Hiring Creative People

The last couple of decades have been oriented to management development and making managers more effective. This emphasis has been so pervasive that many companies have forgotten to look for innovative people; they have been recruiting potential managers only. It seems likely that those who have potential management skills will have entirely different characteristics than those who demonstrate high innovative—but low managerial—skills. It is quite likely companies have been screening out potential innovators during interviewing for technical people because they did not fit the model the company was interested in at that time. Management must be certain that recruiters and supervisors are adequately trained to recognize potential innovators and to bring them into the company when that is what the company is seeking.

Recommendations:

The human-resources department should conduct a program for recruiters and directors of employee relations on how to identify innovative and creative personnel.

The company must actively seek and hire innovative and creative people.

Innovation from Non-engineers

People with special knowledge in field performance, manufacturability, or customer requirements are of great importance in innovation, but companies do not usually involve them in the innovative process. Because of their special placement with regard to a company's products and customers, those people employed in field engineering, manufacturing, and various sections of marketing have a great deal to contribute to the innovative process. They certainly know what customers like and dislike about the products, what makes them difficult to manufacture, and how they ultimately perform in the field. If they make no other contribution, they can inform the company of the weaknesses of its current positions. For this reason it is important to involve them at a very early stage of the innovative process. It would be advisable during the first brainstorming session, where objectives are being set and approaches discussed, to have people from field service, sales, and manufacturing engineering included on the innovative team.

Recommendation:
Management should include field, sales, and manufacturing engineers in the innovative process.

Summary

Top corporate and operating management is the key to whether a company is innovative or not. It must ask for technical innovation, demand it, encourage it, stimulate it, fund it, and reward it. Moreover, it must be willing to accept the risks inherent in technical innovation and must be willing to reward people even though they may have failed—as long as they tried and applied their best judgments. If technical innovation is important to a company, then top management must give time and attention in proportion to the importance management gives to it. And, as usual, actions speak louder than words.

If management decides that it wants to restate its intentions in this area, it must remember that people have long memories. People have been trained, hired, and fired based on their perceptions of the priorities over the last decade. It will take a long time to establish an environment that is more oriented toward stimulating innovation and creativity. Management cannot expect instant change. And, for that matter, neither can the technical community.

Nevertheless, innovation is important to the future of most companies and more effort can be devoted toward stimulating innovation into productive areas. Unless the company changes some of its policies, procedures, practices, and behaviors, it is likely that the untapped innovation potential will not be realized and that the long-term success of the company will be less assured.

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This paper has been called a "virtual field manual for anyone seeking to reorganize for innovation." Part of the genius of this piece is that K. Larry Hastie has taken various ideas about creativity and molded them into a step-by-step action plan. He has also personally tested the plan's viability in actual practice. What you see here is an account of creative leadership.

Larry has a Ph.D. in economics, and has served as the treasurer, and then vice president for human resources, of Bendix Corporation. He is currently president of his own firm in Ann Arbor, Michigan.
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Making Organizations Adaptive to Change: Eliminating Bureaucracy at Shenandoah Life

John B. Myers

Today there is an epidemic that threatens to destroy or, at the minimum, severely cripple many business organizations. The offending pathogens have been isolated and identified. They are well known in the business community and are typically referred to as "rapid change" and "increasing complexity in the environment."

It is not as clear why some organizations fall prey to these pathogens, while others flourish or seem quite unaffected in their presence. A common and significant error made in attempting to understand this phenomenon is to dissect and analyze the pathogens' structure and physiology without examining their unique interactions with the structure and physiology of the organizational organisms they infect.

The organizations that are the most susceptible to these pathogens appear to be those with the generic properties of a bureaucracy. In the U.S., the term *bureaucracy* has taken on a negative connotation suggesting the anxious visions of endless red tape and bungling often associated with government agencies. While most business organizations would be insulted to be called bureaucratic, many in fact do operate bureaucratically. This point can be seen more clearly by looking at a bureaucracy in descriptive rather than evaluative terms.

Characteristics of Bureaucracy

Descriptively, a bureaucracy's structure and physiology can be characterized by several traits:

A hierarchically arranged, functional, and highly specialized structure. Accountants work with accountants, engineers with engineers, manufacturing people with manufacturing people; and in the life insurance industry, which I will be focusing on, underwriters work with underwriters, premium accounting people with premium accounting people, and policyholder clerks with policyholder clerks. Within these functional units, employees are most often arranged in

highly specialized, distinct jobs. Each function is directed by one person who, in turn, reports to a boss who manages similar functions.

A defined chain of command, usually on the vertical plane. Communications are supposed to flow up and down in each functional organization. Except in the most routine matters, horizontal and diagonal communications across functions are not supposed to occur, as such contacts would destroy the order that bureaucracy is designed to maintain.

Clearly defined and evaluated job duties and accountabilities. Nearly everyone has a written job description that has been rank-ordered against other job descriptions. Each rank order is assigned a salary range. Employee behavior is directed toward carrying out the duties specified in the job description. In some organizations, performance standards or measurable objectives have been established for many of the specified duties. The addition of duties and responsibilities generally increases a job's value and prestige. A decrease in either can result in a diminishment of salary and prestige. Since most rewards are linked to the enhancement of the job, behavior usually is oriented toward the best interest of the job and the incumbent rather than the organization.

Extensive use of rules, records, and precedents. To help maintain order and consistency, lists of standard operating procedures, employee handbooks, and various policy manuals proliferate in every corner of the organization. When someone does something novel, there is a knee-jerk reaction in which bureaucrats lunge for their manuals, hoping to find guidance therein.

An emphasis on length of service rather than competency. The amount of verbiage in employee handbooks describing the programs that reward length of service far exceeds the amount of text that describes reinforcements for competency-based behavior, such as creativity or extraordinary service to a customer.

An authority system based on position rather than expertise. Authority resides basically in the position rather than the person. There is an assumption that the incumbent in a particular position has expertise because the person has been screened for the qualifications specified in a job description. This assumption is, however, more wishful thinking than reality. Qualification specification and screening processes are not perfect. Errors are made and are not corrected quickly in most bureaucratic organizations. The net result is that one often finds oneself working on a problem with a person who has the assigned authority and responsibility for solving the problem but has neither the expertise nor the ability required.

The preceding is not intended to be an exhaustive description of the bureaucratic organism but rather a rough sketch of its morphol-

ogy. Nevertheless, these characteristics do indicate the essential reason why environmental change and complexity pose such a threat: The bureaucratic organization's interests are so vested in "what was" and "what is" that it cannot become flexible enough to meet the challenges of change and complexity.

What is needed is a vaccine that will reduce the morbidity and mortality rates for bureaucratic organizations. Shenandoah Life Insurance Company has been working with a particular vaccine for the past two years. So far, it is proving to be an effective immunizing agent against the ravages of the change and complexity pathogens. The vaccine is known at Shenandoah Life as "organizational experimentation."

A Changing Environment

The change and complexity pathogens began their attack on Shenandoah Life during the late seventies and early eighties. Among the most virulent of these pathogens were the rapidly rising interest rates, which caused a massive drain of the company's cash assets. Policyholders borrowed from their whole-life policy cash values at guaranteed, relatively low interest rates and placed these funds in instruments offered by other financial institutions that paid significantly higher interest rates.

Continuously rising interest rates led the company to develop and market a new base-life product with greater interest-earning potential than whole-life insurance. This product, known generically in the industry as "universal life," has effectively countered the interest rate and borrowing problem. However, the product carries with it some side effects that we have not been able to ignore. The universal-life product has much narrower profit margins and is more difficult to administer than whole-life insurance. Since universal life now accounts for eighty-five percent of the company's new individual policy business, the pressures to control costs relative to sales have taken on new and more intense meanings than those experienced prior to the late seventies.

Our efforts to control costs have been complicated by the competing need to improve our service to agents. Competition from life insurance companies, as well as from nontraditional sources, such as full-service financial institutions, has been increasing. Countering these moves on our markets has required an acceleration in product development and the acquisition of state-of-the-art computer technology. Without these measures we would not have been able to offer our agents competitive products on a timely basis. Acquiring product-

development specialists, computer hardware, computer software, and computer specialists has been a sizeable investment relative to present sales.

We have also noticed an increasing demand for improvement in the paper-processing service we provide to our agents and policyholders. Timeliness and accuracy in paperwork saves them valuable time and reduces their frustrations. Since competitors can easily examine our products and quickly develop their own competing ones, the provision of high-quality and distinctive service in this dimension may prove to be one of a few significant ways we can differentiate ourselves on a continuing basis in the marketplace.

Like our markets, our employees' needs and values have also been changing. A 1979 employee-attitude survey revealed that our home-office clerical personnel were less satisfied with supervision, job duties, work-group climate, communication, and training than they were in 1969 and 1972. In fact, personnel reported greater dissatisfaction with job duties, work-group climate, communication, and supervision than their peers in other insurance companies.

These changes in economic and market conditions and in employee attitudes, combined with a rising consumerism and a more difficult regulatory environment, prompted the Shenandoah Life management to start searching for something that would help it manage its business and productivity more effectively.

A Sociotechnical Analysis

Between 1979 and 1982 we identified the need for improved management training and communication skills. During these three years we implemented various managerial and supervisory training programs, as well as an active and successful quality-circle program. In the fall of 1982 we launched a series of two-day seminars on sociotechnical organization design for the president, vice presidents, managers, supervisors, and various technicians. Similar one-day seminars on the same subject were provided to many of the clerks who would eventually be affected by a sociotechnical organization design.

One of the key parts of these seminars was a sociotechnical analysis of one Shenandoah Life case: the processing of a universal-life application that involved the termination of several whole-life policies, refunding a portion of the cash values to the policyholder, rolling over the other cash values into the universal-life policy, setting up an automatic bank draft, underwriting the increased amount of life coverage, and adjusting commissions. This situation was considered to

be a fairly typical one, similar to approximately twenty to thirty percent of the cases our agents were sending us at that time.

The results of the sociotechnical analysis of this case indicated that in the technical realm an on-line computer system was available for processing the case. Thus, it was feasible for *any single employee* (given the proper training and authority) to alter those parts of the computer records that were necessary to complete this transaction. In the social realm the analysis revealed that the clerks responsible for processing this case were arranged in highly specialized, assembly-line types of jobs in premium accounting, policyholder services, gen-

eral accounting, marketing services, policy records, underwriting, receiving, and reinsurance. The management structure above and around these clerks was essentially bureaucratic. Before this case was completed, it passed through thirty-two sets of hands, across nine sections and three departments. The processing required twenty-seven working days to complete.

The following conclusions were reached in the seminars:

The current and projected future computer technical systems do not require sequential processing along an assembly-line in a highly specialized, fragmented work force. Indeed, such a social system cannot utilize effectively the total capacity of these technical production systems.

The assembly-line social system could perhaps be improved—but not enough, in management's view—to serve the marketplace competitively or to utilize fully our technical systems. Further, this type of social system requires a large number of supervisory personnel to direct and coordinate all of the specialists. This is a relative waste when one considers that the supervisors could be devoting their time to projects with a higher potential for adding value to the organization.

The rapidly changing conditions that prompted the company to develop and market a universal-life product would continue to require development and marketing of new products as well as enhancement of existing ones. At the same time the company would have to do a better job of processing these new and improved products because of policyholder and agent demands for better service.

The specialized, fragmented organization is a slow learner and therefore cannot adapt rapidly and effectively enough to meet the challenges that the environment imposes on the company.

A Self-management Team

A key part of the two-day seminar was the introduction of the concept of self-managing teams as a structural form that could be more efficient and adaptable than the specialized, fragmented assembly-line approach. In 1983 Shenandoah Life formed its first experimental self-managing team.

The Team's Characteristics

The team was composed of six nonexempt clerical personnel. They were responsible, *as a group,* for processing all universal-life

business and health insurance generated in Virginia. The phrase "as a group" is stressed here to emphasize that management stipulated no individualized job assignments or accountabilities. The team's processing responsibilities included all tasks related to premium accounting, policy issues, and policyholder services. In addition, the team was responsible for constructing a model office for a computer-system conversion project and for building the model and systems to be used in developing future teams. Members of the team designed their own office layout, for example, as well as aspects of their salary system.

The team members were also instrumental in the design of what is commonly referred to as a pay-for-learning system (although it was management that decided upon the use of such a system). In this system a member is eligible to receive a defined pay increment after demonstrating competency at a particular task. The team as a whole determines which members are competent at particular skills, and the team initiates salary increment requests. Members whom the team deems to be unsatisfactory learners and contributors do not receive salary increments. All team members are permitted and encouraged to achieve the top pay rate, which signifies the ability to process any piece of business from beginning to end without guidance or consultation. Team members are responsible for training one another.

To facilitate learning and cross-training, the team designed its office layout so that the members could face each other, in conference style, throughout the workday and could communicate informally and rapidly.

The team members' jobs immediately before joining the team were in premium accounting, policy issue, and policyholder services, with two members coming from each area. They were elected for membership in the team by their peers.

Management expected the team to be as self-regulatory as possible. For example, a supervisor was not appointed. The team did have several advisors with whom they could consult. These advisors included the second vice president, human resources; the personnel director; the manager of methods and procedures; the managers of premium accounting, policy issue, and policyholder services; and a methods and procedures analyst. Team members were also permitted to contact directly the external consultants who did most of their group-dynamics training.

The self-regulating activities performed by the team included deciding who would know what work, formulating a vacation schedule that minimized the negative impact on production, final selection of new team members, designing the office layout, training one another or arranging for training, determining the basics of the salary system, managing the interface with other units and their managers, and

correcting members who were not contributing their fair share to the team's performance.

As an aid in carrying out managerial responsibilities, team members received extensive training in how to teach and how to be good learners. Group dynamics training in brainstorming, conflict resolution, decision making, negotiations, planning, and team functioning were also provided.

The Rationale for the Team Structure

This approach to structuring the experimental team has engendered a range of reactions. One person angrily labeled the team "social elitism"; others praised it for being "highly innovative." But since labels and evaluation terms contribute little to knowledge and understanding, it is important to explain the rationale for the way the team was structured.

Jobs were not assigned because management wanted to reduce as much as possible the probability that members would serve the interests of their individual jobs rather than the organization's goals. If there are no jobs, job-oriented behavior becomes impossible. A common mission—service to a geographic market—replaced the concept of job.

One reason for substituting a pay-for-learning system for the traditional job-evaluation approach is the belief that creativity is an essential ingredient in effective adaptation to a rapidly changing, complex environment. By arming all employees with increasingly broader knowledge and skills, one increases creative potential—particularly in solving problems affecting the larger systems of the organization. By contrast, the traditional approach, which usually involves training in increasingly narrow specialties, makes people incapable of using their expertise appropriately within the context of larger system needs. Further, in traditional organizations there are usually no rewards for expanding one's knowledge and skills beyond the assigned specialty.

Another reason for implementing a pay-for-learning system is that it helps people become more flexible, which in turn permits the more effective utilization of manpower—another important factor in adapting effectively to a changing, complex environment. The highly specialized assembly-line approach to processing is efficient as long as the documents being processed flow evenly and predictably.

But assume that a company has an assembly-line approach to the functions of policy issue, premium accounting, and policyholder services and that at a particular time the volume of work increases

significantly in premium accounting and policy issue while the volume in policyholder services declines. The traditional organization can work overtime or hire temporary help from outside to try to move the extra volume of work in premium accounting and policy issue. Hiring temporary help is usually not a viable alternative, though, because it is not economical to train these people to do anything more than the simplest work. Rarely would it be feasible to move people from policyholder services to the other two areas, because transferees present the same problem as temporary help—they are not trained to do the more complex among the tasks in premium accounting and policy issue. In addition, their salaries are usually too high for them to do the simpler work within those areas economically. Furthermore, they may perceive the change to such work as a decrease in status. Finally, the supervisor of policyholder services might not wish to release any staff for fear that someone might think his or her area is overstaffed. The supervisor's rewards come from enhancing his or her own job performance, not the performance of others.

The mature, self-managing team does not encounter these difficulties because the number of people available to work on any single task is not limited by relative salaries and status, supervisors' interests, and, most important, training. For example, the number of people working on premium accounting tasks in Shenandoah Life's team of six can range from zero to six in a matter of seconds. As the market environment changes ever more rapidly and unpredictably, an organization's effectiveness will depend on its ability to shift people from regular tasks to unforeseen problems imposed by the changing environment.

The bureaucratic organization is designed to prevent mistakes and to maintain the status quo. One follows the chain of command in these organizations regardless of whether doing so helps to get the job done. For the rules say that this must be so, and everyone has a vested interest in maintaining these rules. The notion of trying to make this form of organization more adaptable is a contradiction in terms—the structure is built to resist change. Therefore, it seemed reasonable to set up the Shenandoah Life team without supervisors, rules, or defined communication channels so that (1) the team and individual members could *change* as they grow and learn, (2) management could discover the extent to which people can manage themselves, and (3) rapid adaptation to various work situations could be made.

Since the bureaucratic organization is designed to maintain the status quo, it will attack and attempt to destroy an experiment, for successful innovations are generally perceived to lead to change. Thus, any organization attempting to innovate should enlist as broad a

participation as possible in implementing the change in order to protect the experiment. The organization will then come to own and embrace what it would normally attack and reject. Shenandoah Life's decisions to have the peers select the team members, to assign a group of advisors, and to train many employees in sociotechnical organization-design concepts were a way of asking for participation in the change and the consequent decision making.

A final point in the team structure rationale is that direction and control of activities by functional and technically competent experts (supervisors) are wasted actions if the people being directed and controlled can manage themselves. Managerial and supervisory training was provided to increase the probability that the team would have the skills required to manage itself and its boundary interfaces.

Results

The team has now (1986) operated as an experiment for about a year. The problems that have developed have been relatively minor and, on the whole, expected. The source of these problems has been identified and corrected. In late 1984 the remaining employees in policyholder services, premium accounting, and policy issue were placed into teams serving geographic markets. The experimental team continues to service Virginia.

Figure 1 shows the organization of the policyholder services, policy issue, and premium accounting groups prior to the experiment and after everyone was placed in a market-service team. The Advisory Team consists of the former managers of premium accounting and policyholder services, the methods and procedures analyst who served the experimental team as an advisor, and a management trainee who had been working in policyholder services. The manager of policy issue resigned during the experimental phase and was not replaced. The general manager is the former manager of methods and procedures. He was also an advisor to the experimental team. At present the company does not have a methods and procedures section. Much of this section's work involved solving work-flow problems between units and jobs. Since many units and jobs have been combined, there is much less flow of work across job and unit boundaries. Thus, the necessity of such a section has become questionable. Furthermore, by having the market-service teams report to the general manager, the supervisor/employee reporting ratio has been reduced from approximately 1:7 before the experiment to 1:37 in 1986.

The Advisory Team has two missions. One is to help the teams to become self-managing as quickly as possible. The other is to serve as

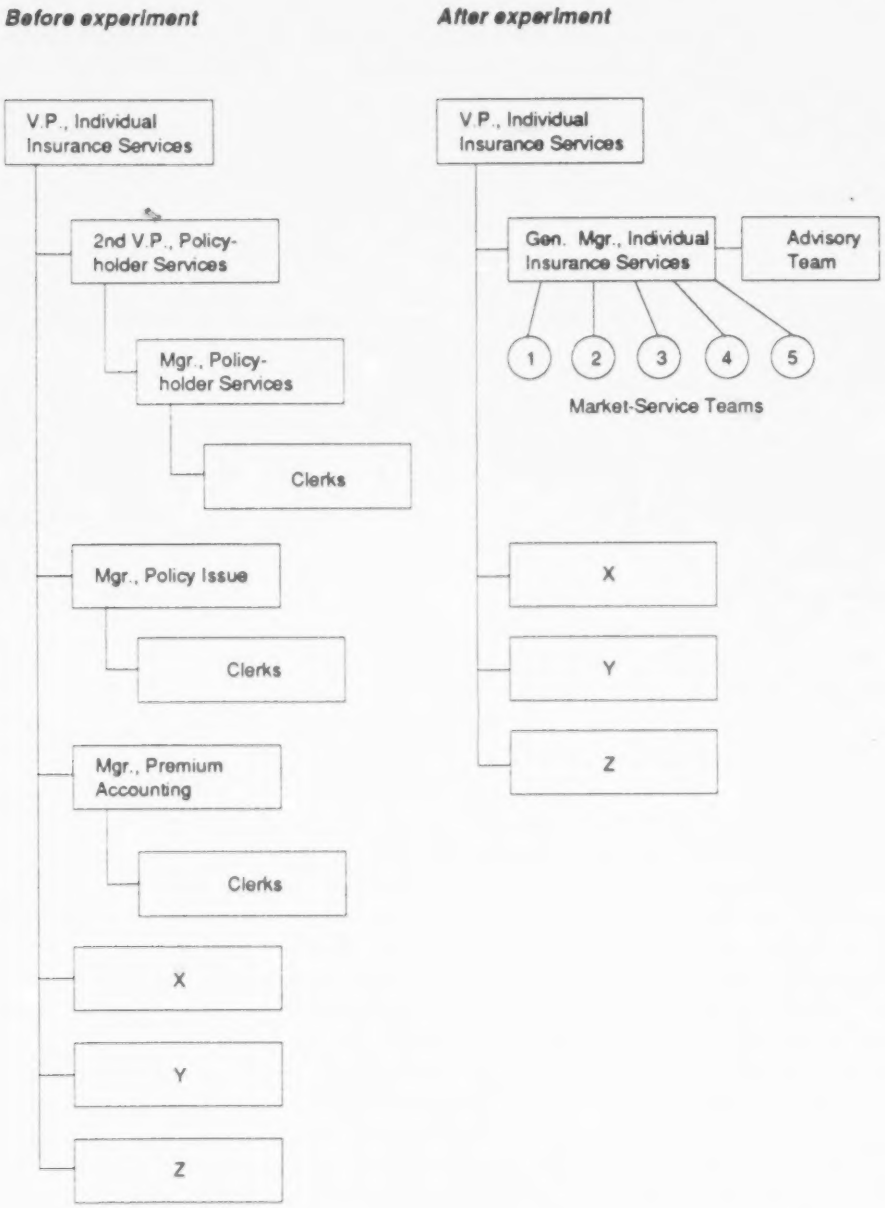

Figure 1. ***Organizational structure at Shenandoah Life before and after the market-service team experiment***

role model for the market-service teams, demonstrating how teams should operate. Since the market-service teams do not report to any of the advisors, and the advisors and market-service team members do not have assigned duties and are cross-training one another, the stage has been set for making labor cost improvements when opportunities occur. For example, when a manager resigns, as did the manager of policy issue, the probability that the person would not have to be replaced is greater in this type of organization. Had traditional bureaucratic assumptions prevailed at the time this manager resigned, a replacement would, in all likelihood, have been hired. A bureaucracy assumes that people and units cannot manage themselves and must have an appointed leader.

In addition to positioning itself for direct cost improvements, the stage has apparently been set for productivity and service improvements. Compared with 1982, the number of people in these three functions has remained approximately the same while new business applications have increased thirteen percent. Beginning in September 1984, when everyone was placed into teams, there was a decline in the number of complaints about service and errors. Even though these data are encouraging, they must be viewed as indicative rather than conclusive. There are many intervening variables that could have a role—either positive or negative—in determining the figures. For example, during this period we have introduced new products and computer systems. Their impact on productivity has not been measured and evaluated.

The most important evaluation to be made is whether the experimentation vaccine has immunized our bureaucracy against the change and complexity pathogens. If a vaccine is to be effective, it must alter the chemistry of the organism into which it is injected. Therefore, the key question is whether experimentation is changing our bureaucratic structure and our ways of responding to environmental change and complexity.

The answer is a definite "yes." Experimentation has become common. We are experimenting with several other exempt and nonexempt salary systems besides pay-for-learning, within the same home-office building. One professional group has formed into a team and has developed a unique peer-evaluation method and process. Other clerical teams, like the market-service teams in individual insurance services, have been developing in marketing services, group underwriting and issue, group administrative services, annuities, and underwriting services. At present an experimental team of professionals from different disciplines is being formed to manage all aspects of a particular product line. This represents a radical departure from the

traditional specialized and functional approach to organizational structure.

The primary weakness of a bureaucracy is that it is prescriptive by nature. It defines its structure and methods as ideal. Thus, there is no reason for it to experiment with alternative forms of organization. The fact that Shenandoah Life is experimenting means that it is no longer a bureaucracy but an organization that is continually seeking new ideal states so that it can operate effectively in a rapidly changing, complex business environment.

Note

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When I read this paper I am reminded of a term that has recently entered the literature: learning organization. *Any organization that, as described here, changes its structure and adjusts its activities based upon its own experience is worthy of the title.*

Although John Myers is no longer with Shenandoah Life (he is currently vice president of human resources for Eclipse, Inc., an organization in the Midwest), the company still operates the teams, changing their functions as circumstances vary. And the company is still quite successful. People from other companies, and from other countries, continue to call. They ask to visit and learn how Shenandoah Life designs and trains its self-managing teams.

Jack Cochran, a vice president in customer services, has been responsible for these work teams since John left. He writes, "In 1987 our company was a runner-up for the United States Senate Productivity Award in the Private Service Sector category for Virginia. A recent customer survey rated our Customer Service teams on timeliness (team response time), accuracy (team error rate), and overall team services. Ninety percent of the customers rated Shenandoah very good. In 1988 . . . we were awarded first place by the U.S. Senate in the Private Service category." ***SSG.***

Structuring for Innovation . . . And the Bottom Line

Robert L. Swiggett

Ask anybody who manages a big business and you will hear that one of the things that drives us, and is something we have always worried about, is this: If capacity exceeds demand, profit vanishes. And so innovation has to be our game.

After a long period of trial and error, we have found two things were crucial in fostering a lively spirit of innovation at Kollmorgen: a culture of trust and the use of small work teams as opposed to large functional operations.

But first let me give a little background and talk about some of our mistakes along the way.

From its founding in 1912 until about 1960, Kollmorgen was dependent on government defense contracts. For example, we built the first submarine periscopes. The company prospered during wartime but nearly went broke in between wars. So, in the late 1950s, Kollmorgen began to acquire a number of small companies, each with its special technological niche. After ten years or so, Kollmorgen had acquired thirteen small companies.

During the 1970s, as this company of separate entrepreneurial elements came together, Kollmorgen had to figure out what it was. It had to figure out what the headquarters corporate organization was supposed to do.

Was it supposed to run the operation? Did it sell? Did it make things? Did it do engineering? What was its job? It had to decide how it would relate to people like me who were managing divisions or groups of divisions.

Centralized Operations

During that time we made a lot of mistakes. In manufacturing, for example, we tried to run a printed-circuit-board shop of almost one thousand people with a central computer. We had been having a lot of trouble with customer satisfaction. We had thousands of open orders in the shop, each going through thirty or forty different steps—through ten departments.

So we hired a bunch of computer experts and ordered an IBM system 360 model 30, disk files, a lot of on-line stuff, and we wrote some programs. I think we had one of the best systems in the United States.

Well, in the end we got it on-line and working, and what did we find? We found we knew everything about everything. We knew the causes of all the rejects. We knew where every part was in the shop, more or less. We had a very good idea about all our costs. We could tell all of our customers why, exactly, we were going to fail them; but for some reason, we were never able to run the shop any better.

This trend toward central control spread to other functions in the company. In marketing, for example, each division sold things in Europe. So, we assumed that a central European marketing organization would help us sell all our products in Europe. Well, I will not try to describe what a disaster it was. It was just horrible. We eventually had to disband the entire staff and turn the thing back to the divisions.

We had learned a lesson: it is not easy to manage certain things centrally using a computer. The real problem was the computer did not understand human interactions. It could not deal with the trade-offs which were necessary in a very complex operation.

Traditional Hierarchy

We had a classical hierarchical organizational structure. A couple of group vice-presidents really thought they ought to be running the divisions. They were always meddling in the decision-making processes in the divisions under their control.

We had an adversary relationship. When I was at the division-head level, I spent all my time fending off the corporate organization and giving freedom to my divisions. Those divisions which fought off corporate intervention became winners.

How did I do this?

Well, it involved a considerable amount of personal risk. When my boss wanted me to do something with a division, I spent a lot of time and energy arguing. I was a real hardhead. I took strong positions; I just would not do it. Since our divisions were doing well, they did not have the courage to fire me. It was very much an adversarial kind of situation. Things were quite tense.

Another thing, the chairman of the company wrote a lot of memos. So you would get a flood of material that would come out of his office on Monday morning.

I hated those things. I told him, "You're a great guy, but I want you to talk to me. I don't want to get a written communication. Will you

please just talk to me!" Well, he kept sending them. I would throw them away without reading them.

Finally, he'd get about six lined up, and he would ask me what I did about this, that, and the other thing. I said, "I didn't read it." Of course that would precipitate communication.

The "Live Five"

During this period of centralization a group of us who considered ourselves the future management of the company came together. We called ourselves "The Live Five." We tried to evolve a management theory.

We read all the books on behavioral psychology; but, the one that hit us most was *The Human Side of Enterprise* by Douglas MacGregor. The whole concept of trusting and believing in people, understanding their behavior, was so well presented in that book that it became almost a bible to us.

We also ran across a paper, "A New Corporate Design" by Jay Forrester, a professor at M.I.T. It was a suggestion about how free-market principles apply to organizational design to motivate people and get better results.

These writings were beginning to help us understand how to cope with the huge problem of managing a shop of one thousand people. Throughout this period, experiments with team manufacturing were beginning to succeed. We were learning how people work together well in teams.

Until then, managing that shop was like trying to pull the front car of a multicar train where all the cars weighed different amounts and were connected to each other with different strength springs. Just imagine all of those cars moving across a room on a slippery floor. It is a totally disconcerting problem. By the time you get everything over to the other side of the room, you will be demolished by all the cars when they come at you.

Yet this is infinitely simpler than trying to put a job through a shop of one thousand people, through ten different departments, each with a yield problem (cannot get all their work done), each with different processes.

So we began to understand the imponderability of major problems. We saw how it is necessary to break problems down so that individuals can comprehend them and make the necessary trade-offs to get things done.

We were shooting for an emotional attachment, the kind that makes people feel good about themselves and become very productive.

For example, in our printed-circuit business we had a group who made prototypes. This is where we learned first about the advantages of small teams. This crowd ranged around twenty-five people, and their sole job was to take small orders and turn them around quickly, in a week or three days. If we ran that through our factory, it might take six weeks.

They had no paper work. They could shout all the commands. They did all their own billing, their own shipping. They made contacts with customers individually. They knew what their job was and they got very excited about it. They got even more excited at the end of the month when they got a profit and loss statement showing their success.

They were aligned. If everyone is going in different directions, like those cars in the train, you don't make it.

From all this reading and these experiences, we put together a model of how things get done (see Figure 1). We have vision at the top, then structure and trust. The leader is in the middle. Every team has a leader. Every team should have a vision. And you need an appropriate structure to accomplish that vision.

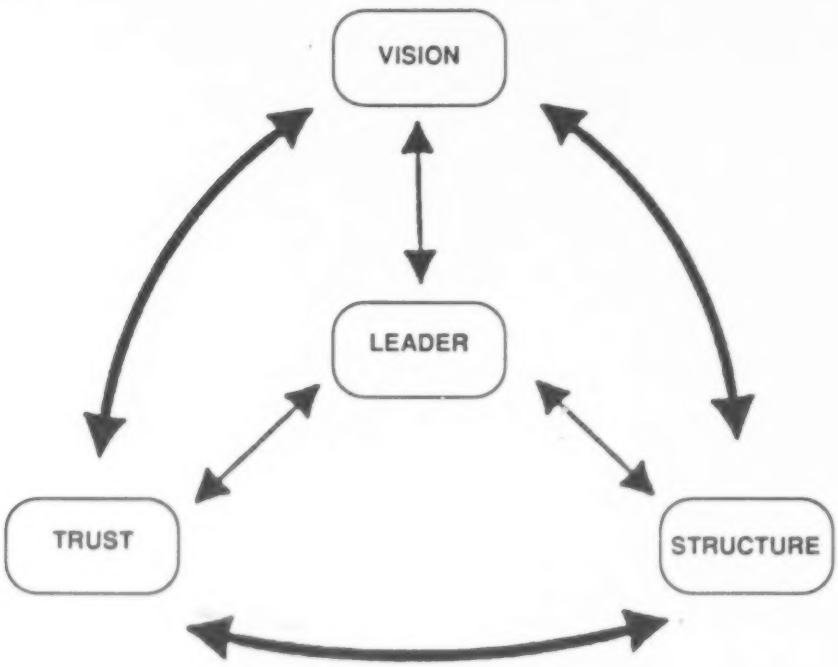

Figure 1

We found, by trial and error, if everyone trusted each other, and you did not have a lot of control procedures, things worked much, much better. And when alignment was achieved, trust was reinforced; rules were unnecessary. People all came in early and left late. There was enthusiasm. Everything hung together.

If the structure was wrong, it did not work. If trust was lacking, we had trouble. If the leader could not generate all three, you had disaster. So we figured these were necessary conditions.

We asked everybody to envision a large diamond that rotated. Inside this diamond was a white light. We told everyone to look at the diamond as it went by and pick a facet that applied to them; how they could get a concept of doing the job better than any of their competitors.

And they wanted the organization to be number one. That was the tension creator. If you were number two in the market, it was intolerable. You had to get to be number one. And you had to innovate, in a product or service sense, to achieve that status.

We not only wanted to achieve excellent economic results, we wanted to be socially better. We wanted people in our company to have lives that were better in every sense than the lives of our competitors.

The New Culture

Basically, we believe people are good. They need freedom and self-respect. They need to feel they can control their destinies. They want equality of work, of opportunity. They want to be trusted and to feel they are partners in the business. We told everyone honor, truth, and openness have got to be pervasive. Whenever we found times when people were not straight, we would come down on them very hard. Openness means you can argue, but nothing gets hidden.

Love is a big word. We argued for a long time on whether we should include a mushy word like that. Today I think love gets talked about in an industrial environment fairly frequently. When we started talking about love, that was really risky. Yet, when we found groups who really hung together, the relationships in those groups could not be described by any lesser word. They just had this tremendous feeling for each other, and what they were about, and what they were trying to do.

Also, signals are important. You can say all the words, and they are just words. The important thing in making the culture work lies in making people feel good about themselves. If people are feeling good, trying hard, and feel a part of the organization, then they will be

creative. They will take chances; they will be innovative. We did a lot of great things technically during this period, and we still are.

Okay, what are some of those signals? First, all information is available. There is no information all people in the company cannot have—just ask for it. We publish salaries, for example. All the P&L's were distributed broadly throughout the whole company.

We threw out all the policy manuals and rule books. We said there would be no audit department. We put everybody on salary. None of this sick-leave jazz; if you get sick, you get paid. And no time clocks. But you have to tell us how long you worked. This bugged the government; but, because we were straight, we were able to convince the doubters we did not need all that stuff. In fact, our attendance improved.

Attitude Toward Failure

Those of us who had been successful inventors had all been engineers and came from an academic environment where failure was normal. We understood that if you set out to do something really tremendous, you were probably going to make a lot of mistakes. And those mistakes were going to be made by people who were really trying. The thing we tried not to do was complain about failure.

Of course, in the real world, with real people and real emotions, failures are not well received; but, how do you bias the organization? Is it in the direction of inquiring about failure and punishing it? Or is it in the direction of approving the effort to try and congratulating the winners?

Now, did we see a lot of failure? Indeed we did. And we still do. On the other hand, the people who are making most of the mistakes are the ones who are coming up with the real hot answers.

Structure

We found that the structure should be as flat as possible. We eliminated the group vice-president level. From top to bottom, we like five or six levels of supervision. We like divisions to stay small. When they get to $50 million or $60 million in sales, we try to figure out how we can split them up. We began with eight divisions; now (in 1986) there are sixteen.

The whole idea is to give that feeling of a small team. When the division president cannot know about the spouses and children of his employees, much less their names, then there is trouble. I think it is

ALL POLICY MANUALS, TIME CLOCKS, AUDITS WERE THROWN OUT, AND ALL INFORMATION WAS AVAILABLE INCLUDING SALARY DATA AND THE NUMBER OF FAILURES.
HEY GANG! JONES HAD THE MOST FALSE STARTS THIS MONTH!!
YEA! WAY TO GO, JONES!
WE'RE NUMBER ONE!
WAHOOO!

very important that this family sense, this sense of unity, be there. When the organization gets too big, it is very hard for that to happen.

In terms of maximum load, I would say that when a division gets over five hundred people, things are getting very tough. Basically, at that point the division president begins to lose touch with individuals and is forced to split the division into profit centers and hope some of the profit-center managers have that close, team relationship with employees that existed at the beginning.

Functional Operations

Functional organizations, where you have a corporate chief engineer or production manager, seem to be inimical to small-profit-center managers.

When you start out, you usually have somebody in charge of the money end of the business; then you have got somebody in charge of producing the product; then you have to have somebody to design the product, a creativity unit. So you have various functional elements: financial, production, design, and so forth.

Now, as these fellows grow, they build little functional empires. They become fiercely protective of their turf. This is one problem we

find the most difficult to deal with as the organization grows—the breakup of functional empires.

These empires become very strong, and for a lot of good reasons. There is a career-path problem. People like to see where they are going in the organization. If you come in as engineers, you want to see how you can get a bigger job as an engineer. If you are a production manager, you do not want to see your organization fractionated into a bunch of little teams. You want to have the whole damn thing controlled, because that is why you get paid. You get paid for bossing around a lot of people.

Moreover, new people who do not understand this idealized, fractionated concept—who come from companies full of control systems, where there is no trust—have no other way to think or work. They will try to contaminate you.

But the main problem with large functional operations is that long decision chains are implicit. We have found short decision chains are vital. Decisions should not be pushed up any more than absolutely necessary. Decisions must be made at the interface where it makes sense.

For example, our whole system of financial reporting is organized around the idea that you spread responsibility to as many places as possible: for pricing, for delivery, for performance and leadership. In this way, everybody shares the profit. Everybody understands the game. Everybody is close to the customer.

We have simplified making decisions at the division level by having the division president report to a board of five or six people. This board is made up of corporate officers and other peer division presidents. We do not want division leaders to buck things up the ladder to some corporate decision-making power. We have a tiny corporate staff and very little paper. We have five thousand people and a corporate staff of twenty-five people, including secretaries.

In summary then, when you get big you lose trust, you lose informality, you build up elaborate control systems. You build empires which have to be protected. You lose desire and vigor because the company gets kind of fat and successful. You lose the perceived necessity to bet the company on a new idea.

Given this reality, there are two key factors. One is the nature of leadership. It has to perceive the threat to the culture and defend it by whatever means possible. In my perception, the best way to deal with those threats is structurally, to fractionate the organization physically, perhaps move it. Get the leaders to head new crowds so that the original condition can be retained over and over.

The other critical factor is time. If you remain small and do not grow, the old machine just kind of runs down. Growth is critical to

enthusiasm and success. Lacking the growth, time will kill you. It really will. It is very hard for the best guy to keep a whole squad of people excited if nothing happens. They will put up with it for a few years, but not for ten or fifteen.

So we have always deemphasized functional organizations and emphasized small business units. We think by and large, except for capital, that economies of scale are illusory. The businesses we are in do not lend themselves to great efficiencies by having large groups of people making the same thing. I think you can argue this is true even in making automobiles. What I have seen in Japan with team manufacturing, and in other places, seems to indicate that perhaps economies of scale do not work in most businesses.

Leadership

This now takes us back to that question we were asking in the early 1970s: "What does the corporation do?" At best it judges people. It serves them. Leaders are servants. They are not managers. It is their job to get the troops in the shade, get them fed before they sit down. It is their job to park in the back of the parking lot and have the longest walk to the office. They do not have big offices in the corner. The idea is that the leader comes in first and leaves last. It is his or her job to be a servant or helper, not a boss or manager.

A leader has to create and preserve a vision with greatness. This might be a department foreman, not necessarily a division president. It could be an engineering project manager. He has got to choose and he has got to judge the team players. The toughest role of a leader is to call shots on whether people are performing or not, meet issues head on, and take care of people and assign them to the right places.

The leader has got to organize the structure which achieves alignment among his troops. He has got to serve those troops. And he has got to nurture the culture of trust by his own behavior and by the way he handles people. He cannot expect anybody else to do it for him. There is no formula for structure. There may be some concepts; but, there is no formula.

Finally, the leaders in our system, and there are many, are really keen on innovation, meeting customer requirements, and beating the competition by being creative.

I guess where we are coming from is that you cannot make people creative; you cannot make them more than they are; but by an inhibiting structure and by your behavior you can certainly keep them from creating. You can have a negative influence on their enthusiasm.

You can dampen their ability to win by the structure, by the culture, and by the way you are organized.

Douglas MacGregor said that people are creative and all you have got to do is release and channel this energy. That is what we are trying to do: to release the natural energy that our people have.

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Kollmorgen Corporation—a diversified manufacturing company headquartered in Stamford, Connecticut—and Bob Swiggett first became known to organizational psychologists in the mid-eighties when the company and its leadership were mentioned in a paper by Charles Kiefer and Peter Senge entitled "Metanoic Organizations," which appeared in the book Transforming Work *(Alexandria, Virginia: Miles River Press, 1984), edited by J. D. Adams.*

Swiggett, an engineer, began his career at Kodak and than moved on to Kollmorgen. The fit was right. He had strong values—an enlightened materialism balanced by a strong sense of the worth of the individual—and he helped build these into the company.

The structural changes that were made in order to ensure that this balance was present in the company included establishing fourteen autonomous divisions. This small-is-beautiful philosophy, with its drive for decentralization, makes it possible for each employee to feel that he or she is a part of a family where personal contributions matter.

What happened at Kollmorgen was a sign of things to come. Today, more and more companies are learning from the struggle described by Swiggett. And you hear these phrases again and again: empowering people, shared responsibility, vision, autonomous work teams, honesty, and trust and integrity. ***SSG.***
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Leading a Revolution in American Health Care

Erie Chapman

Violent revolutions are rarely, if ever, led by people in power. The least likely person to lead a revolution in the American colonies was King George III. King Louis XVI was an improbable candidate to lead an overthrow of the French government.

But other kinds of revolutions can and should be provoked by the established leadership—the leader with a conscience who wants to begin the change at the top and who recognizes the following basic elements which are present in any revolution: (1) a present and pervasive injustice; (2) a large number of people who are aware of the injustice but feel powerless to accomplish change; and (3) a leader, or leaders, who must, at the minimum, understand the above, believe in themselves, believe in their mission, have a vision for how to accomplish that change, have a depth of commitment which is both passionate and persistent, and have an understanding that the revolution will only succeed if the vision is shared by the mass of people "on the front lines."

The Problem

The single biggest obstacle to positive change in health care is, of course, inertia—inertia which comes from years of doing things the same way—inertia that is protected by the champions of the status quo who cover over mediocrity with arguments about tradition and who defend abuse of patients by claims like "everyone else does it this way."

Is there a problem in American health care? Arguably, we have the finest hospital buildings, the best broadly available drugs, the best trained physicians, the best trained nurses, and the best broadly available medical technology of any health-care system in the world. Most American patients receive the "right" drugs, the "right" x-rays, the "right" lab tests, the "right" surgery, and the "right" medical therapies. Furthermore, the "right" health care is available to just about anyone.

If all of this is true, and I think that it is, then why ask questions? Not only are we no worse than anyone else but we may very well be

"better." But how would you like it if the motto of your hospital was, "Come to us; we're no worse than anyone else."

Let us go on an imaginary tour through the American general hospital. You are a seventy-year-old and you have just been involved in an automobile accident. You have sustained some cuts and bruises, are shaken and frightened by the accident, and feel some vague abdominal pain. A friend drives you to the hospital. You are able to walk to the front door of the emergency room. As you cross the threshold, what are your needs? Why did you come to this hospital? What do you actually expect? What do you have a *right* to expect?

One hundred percent of the patients who enter an emergency room are seeking the same thing, and it doesn't take much insight to guess what that thing is—quick and competent medical treatment. Yet the first person you will meet in most emergency rooms is not a nurse or even a receptionist but a registration clerk. You as a patient want treatment. We in hospitals want to register you.

Unless your injuries are obviously severe, it is likely, in most emergency rooms, that you will begin to experience the process of being degraded. Step one in this process, a step that will be repeated throughout your stay in most American hospitals, is called WAITING. Unless you are President of the United States, YOU WILL WAIT. You are now under our control. Whether you are an assembly-line worker or president of a company, you have become our prisoner. You want your health back and we won't give it to you unless you follow our orders. As long as this perception exists, you will do whatever we ask. After all, what is more important than your health—especially when you don't have it?

A typical next step in the hospital treatment process is that we take your clothes away from you. Just like a convict you are asked to strip, and just like a convict, you are handed a degrading uniform commonly referred to as a "patient gown." I have seen the strongest of personalities converted to the mentality of small children once they don one of those infamous patient gowns. Consider the following dichotomies between me as your doctor or nurse and you as a patient: I am healthy; you are not. I wear a uniform; you're not even wearing your underwear—just a hospital gown. I am standing; you are sitting in a wheelchair or you are lying down. I know about medical treatment; you don't know anything. I am confident; you are scared. I can probably give you your health back; you probably cannot get your health back without me. I am "young"; you are "old."

The contrasts go on and on, but the single message is loud and clear: You are my hostage. You must obey.

A little bit like the interlocking pathologies of abusing husband and battered wife, I will only release you after I have given you "the

punishment you deserve." One big difference is that society not only condones this strange, decades-old relationship, it applauds it. If you are admitted to the hospital and stay for about six days, you will be repeatedly assaulted, physically and emotionally, by a team of thirty-five to forty different people day and night until *we* decide to release you. You will be poked and prodded and stabbed and fingered and exposed and x-rayed and drugged. In the midst of all this, if you attempt to sleep, the likelihood is that you will be awakened several times in the course of the night and day so that we can give you something to "help you sleep." During your stay, it is likely that you will be placed in a room with a total stranger, sometimes separated from you by a curtain which blocks vision but none of the other senses.

Periodically strangers will enter your room to clean it, deliver food, visit your fellow patient, fix the lights, or (and here comes one of the scary parts) come to "take you for treatment." Even the most painless of procedures, a routine chest x-ray, will probably require you to sit in line and wait in your wonderful patient gown. There is no way you can advance your place in line while you are waiting, and it is very tough to get up and go to another hospital. Frankly, there would not be much point in leaving anyway because you would wait at the other hospital also.

Your family may come to visit you (if you have a family) but they will be required to leave after visiting hours (like most American prisons). When you are finally discharged, you or your insurance company will be billed several thousand dollars for your visit (*not* like American prisons). Will you have your health back? Maybe.

Is this what we expect from our health-care system? Is this what we have a *right* to expect? Although you know that everything that I have described above is essentially accurate, I suspect that it has not occurred to you that any of this is basically unjust. If it has struck you as unfair, it probably has not occurred to you that *you* should be the one to try to change things. So expected is the above treatment that many patients at the hospitals which I run, after undergoing the above experience, send me a note thanking me for the excellent care which they have received. Perhaps that is because we are not only no worse than anybody else—we are a bit better. But we are not different, yet. Something is wrong with American health care. The time for revolution has come.

It is Time for a Revolution: Who Will Lead It and What Will They Do?

What I have said in the description above is that we have an American health-care system which gives great medical care and

terrible human care. One highly attractive notion is that patients should be "partners" in their own health care. After all, each of us knows the unique aspects of our own bodies and we are the ones that will have to take the steps down the pathway back to wellness. We are the ones who choose what foods we eat, what conditions we live in, how we will deal with stress, and what advice we will follow. The doctor should be our partner, not our warden.

But the actual fact is that the human side of care in American hospitals is a crime and we who operate the hospitals in this country are the criminals. In an enlightened society, I would argue, the wisest approach to solving this problem is a process of rehabilitation rather than a concentration on punishment.

Where should the change begin?

Change on the Front Lines

Although the executives of our hospitals must take the lead, the real change will have to occur with the people who give care—nurses, technicians, doctors, social workers, and anyone else who interacts with patients and their families.

We must find a new pathway, because wrongs continue to be done along the old pathway. It is time to right those wrongs. I have never met a single doctor, nurse, or other medical professional who felt that they were intentionally degrading a single patient by their actions. One certain way to insure that things do not change would be to berate front-line staff. It is useful to note that a key element of every criminal act is intent; and this element is lacking in virtually every case of abuse in health care. Nevertheless, the wrongs continue because they have not been recognized.

The Change Agents

The change agents need to be everyone in the hospital, and the leaders of the hospital need to empower this change by: portraying the need for it; giving permission for that change to occur; supporting risk-taking; cheering for every success, whether big or small; actively participating in bringing about that change by working alongside the staff; and recognizing that there are two groups of people working in hospitals, the front-line caregivers and the people who support them (presidents and vice presidents are in the second group).

The Allegory of the Cave and the Pathway to Awareness

One of the most famous and instructive stories in all of literature is Plato's allegory of the cave. As I remember this story, three men are tied together against a large stone facing towards the back wall of a cave. They are bound in such a way that they are not able to turn their heads and can only look straight in front of them. In the allegory, we are asked to accept that these men have lived this way all of their lives.

On the other side of the stone, a fire is built and people walk back and forth between the fire and the stone, casting shadows on the wall which the three prisoners can see. Everything these three prisoners know about life and about the shape of people is through the silhouettes which they see cast on the wall. At one point one of them is released by a guide who brings the person around to the other side of the stone. The freed man sees that there are three dimensions in the world. He sees the light of the fire, he feels its warmth, and he begins a journey with his guide up a pathway towards the mouth of the cave. As he proceeds along in his journey his awareness grows. As he passes out of the mouth of the cave he sees a world around him filled with trees, birds, clouds, animals, and all else in nature. He continues on in his journey of awareness until he reaches the moment when he experiences the highest state of awareness and knowledge. This state of awareness is symbolized by his ability to look directly into the sun wherein he sees all truth (and, in the story, suffers no eye damage). After this, he is taken back down into the cave where he is tied up again next to the other prisoners. He attempts to describe to them what he has seen, felt, smelled, tasted, and learned. Of course, they do not believe him. They conclude that he has lost his mind and they ridicule him.

When a leader has reached a high level of awareness and clear vision, how does he communicate that new vision to others? The three most common ways which people learn information are: to be told; to be shown; and to be involved.

Clearly the last of these options is the most effective. For example, I can tell you how something should be done and you may understand part of that. I can show you how it is done and that may tell you more. But only when I ask you to do the thing do both you and I know if you have fully understood the message. The principle of involvement is the single least understood aspect of communication. An understanding of the basic importance of involvement is critical to the leader's ability to bring about change and to know that others will join him as he leads the way down the new path.

What is the Current State of Leadership in Health Care and Who is Not Likely to Lead?

Among my colleagues running the hospitals of America, I detect very few individuals who seem committed to fundamental change at a deep level.

In general I would describe many of my fellow hospital chief executive officers as a group of men (and a few women) who are pleased that they have made it to the top of their organization and who are interested in protecting their positions. Hospital presidents have always been a little bit like mayors of cities, balancing various political factions—board members, doctors, employees, community leaders, etc.—trying to keep things in balance. Recently there has been an increasingly competitive focus among hospitals, which has often had the effect of generating attitudes of suspicion, as well as a focus by CEOs on strategies that will give their organizations a "competitive edge."

To the extent that this analysis is accurate, it is clearly not a portrayal of a setting that would support innovation and risk-taking. To suggest the word *revolution* to this group is to risk being branded as one who might better serve as a patient in the hospital than as the president.

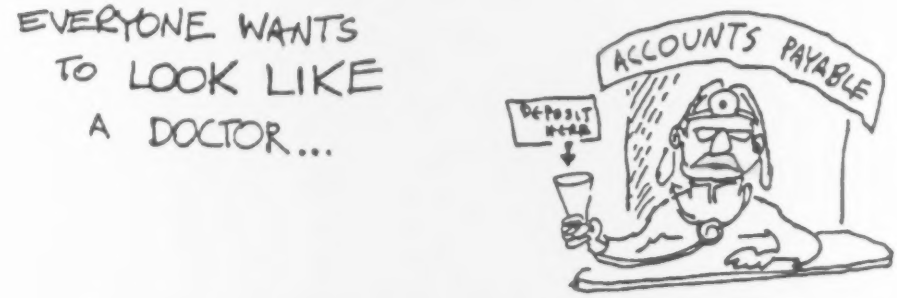
Everything about hospital organizations militates in favor of the status quo and against change. Earlier I compared hospitals to prisons. Hospital-management organizations often look very much like the military. Just about everybody wears uniforms and the uniforms not only denote hierarchy and status but also suggest a rather clear chain of command.

One difference between the military and hospitals is that there are two lines of command in hospitals. One line of command flows out of who has control over care of the patient. The other line determines who has control over the people who have control over the patient.

In the first group the doctor continues to reign supreme. His or her uniform is the white coat; the baton is the stethoscope. In the old days (up through the 1950s) this command presence was so strong that when the physician entered the nurses' station all the staff was required to stand in his presence. Today doctors complain that they can barely get nurses to answer them, much less stand up. In any case, the physician still maintains a position of high prestige, and the most important orders are not carried out without the doctor's "order."

Of course, people have noticed the power which the physician holds, and they have noticed what he looks like and how he dresses to achieve that power. Accordingly, just about every caregiver in a hospital tries to drape a stethoscope around his or her neck and wears a

beeper in some prominent location. To the uninitiated many x-ray technicians, respiratory therapists, nurses aides, and housekeepers wearing scrub suits in surgery could all be taken for physicians, based upon their dress.



Registered nurses rarely wear caps anymore, yet nurses aides, unit clerks, and LPNs do their best to replicate the appearance of the RN, who is the individual who stands at the top of the nursing hierarchy.

Basically, orders for medical care continue to flow primarily from the physician to the nurse or technician or therapist who administers care to the patient. But the nurses and other front-line caregivers are not employed by the doctor. Instead, they are employed by the hospital and the hospital has its own hierarchy of managers clad in business suits, indistinguishable from their counterparts in industry.

In most hospital organizations—especially the large ones—there are incredible layers of management between the front-line staff nurse and the president of the hospital. Consider the following series, which is typical:

1. Nurse's aide.
2. Licensed practical nurse (LPN).
3. Staff nurse.
4. Charge nurse.
5. Assistant nurse manager.
6. Nurse manager.
7. Assistant vice president for nursing (here we begin with business titles).

8. Vice president for patient care services.

9. Executive vice president and chief operating officer.

10. President and chief executive officer.

There are eight layers of management between me, the president, and the nurse's aide, and six layers of management between me and the staff nurse on the floor. Meanwhile, I do not make any "command" decisions with respect to the direct care of any individual patient—those command decisions come from an independent contractor called a physician. (I do, however, retain the authority to fire anyone in this chain of command except for the doctor, unless he is employed by the hospital.)

There is one, and only one, circumstance that I can think of when the military chain of command is desirable in a hospital setting: when there is a crisis. At the moment a patient has a heart attack, a military chain of command is a marvelous thing to behold. Nurses and doctors shout orders, equipment is rolled into place, drugs are given with precision and professionalism, and patients' lives are routinely saved by the efficiency of this process.

Of course in actuality these crises occupy a fraction of one percent of any 24-hour period in the hospital. Yet this presence of potential emergency hangs over the hospital all of the time. Like the fire department or the army, we are always poised for the moment when the voice on the PA system calls a "Code E" or a "Code Blue." We act as if we need the military approach all of the time when the actual fact is that this military command structure is incredibly damaging to the process of constructive change in the human care of patients. It is used endlessly as an excuse to explain away abusive treatment of patients. For example, the nurse tells the patient, "I can't give you this medication because the doctor hasn't ordered it yet and I can't bother the doctor right now." The implication is that the doctor is engaged in some lifesaving activity when there is a good likelihood that he is playing golf, talking to his stockbroker, or, more likely, talking to his lawyer.

The medical staff. Although doctors are well paid generally, they are also a terrifically hard-working group of professionals who are subjected to a barrage of interruptions from patients, fellow doctors, family members, stockbrokers, investment advisors, office staff, utilization-review coordinators, and insurance companies. Meanwhile, they practice medicine in a setting increasingly hostile to their best efforts and insensitive to rising malpractice insurance rates and decreasing respect for their credibility and dignity.

This group of physicians may be as ready now for change as they have been in the last fifty or sixty years.

Nevertheless, the hospital structure as described above presents enormous obstacles to revolution. To suggest change is to imply something which might risk a patient's life or safety, jeopardize accreditation or licensure, increase the chance of a malpractice suit, or go against existing policies that have been built up over decades. In addition, there is always the sense that any significant change needs to be approved not only by the medical staff but by the board of directors.

The board of directors. The hospital board of directors is a well-meaning group of volunteers who visit the hospital for a few hours each month to attend meetings of an organization that is as foreign to them as it is to most other hospital visitors. Since the care of the patient is the domain of the doctor, hospital board members typically turn their attention to finances, something which they can not only influence and control but also more easily understand than the jargon of the medical profession.

The patient. Finally, the patient himself or herself could view radical change with the greatest skepticism. A key shibboleth in hospitals is cleanliness, which equates to sterility, which equates to safety. Linoleum floors, tile walls, and metal furniture may look cold and ugly but they seem to support the goddess of cleanliness. Accordingly, hospitals look, smell, and sound like some of the most unpleasant places anyone would want to be. Patients accept the unnecessarily sterile look of hospitals and some think that changes would shake their confidence.

It is an interesting job to be head of an organization which every person wants to leave and no person wants to come to. On a Saturday night when one of your friends says, "What shall we do for fun," no one suggests that it would be great to check into the hospital.

Hospital employees know that the patient does not want to be there—they often do not want to be there themselves and are looking forward to the end of their eight-hour shift. This sets up a sad dynamic where the patient resents the x-ray technician and the x-ray technician resents the patient. The patient views the technician as necessary but bothersome, and the technician may view the patient as a body that needs to be x-rayed.

Of course none of these attitudes are things which we want to promote, but a blunt look at the daily and nightly operation of the American general hospital can often reveal a sullen crowd of patients who want to be home and a harried group of nurses who would like to get to the end of their shift.

In spite of the grim portrayal presented above, it is my view that almost every person who works in a hospital cares about the patients in that hospital. Every one of them would love it if the atmosphere changed and they felt permitted, encouraged, and empowered to reach out to their fellow human beings who look plaintively to them for solace.

How do I know this? I know it and you know it because we know that every being on earth shares a common emotion. We all have hope and we all seek meaning.

The existence of hope in the hearts of each of us and the search for something meaningful is enormously important in the health-care revolution that will one day come to America's hospitals.

Solutions

In an extraordinary set of papers, Charles Kiefer and Peter Senge have described a process of change in organizations, and a way to bring about that change which is a powerful learning for any individual committed to leading a revolution.

Many writers from Peter Drucker to Tom Peters to Ron Zemke (*Service America*) to Warren Bennis (*Leaders*) to Charles Garfield (*Peak Performance*) have described the process of leadership and innovation and have outlined characteristics of the leading-edge organizations. However, Kiefer and Senge (1984) seem to have come up with a particularly good set of descriptions for the organization which we are trying to develop to revolutionize the way we give health care.

Everyone, of course, would like to feel part of a team that is viewed with respect, wins when winning is important, and is composed of a group of talented and committed individuals. Kiefer and Senge describe the numerous examples we so often hear of groups of people who "have united under extreme pressure to achieve seemingly miraculous results." They also contend that "these occurrences are much more frequent in American business than is commonly suspected." Consider this paragraph from their paper on experiments in organizational innovation as they talk about the elements and the emotions of a peak performance:

> There is a sense of sustained exhilaration, a moment of peacefulness in the midst of frantic activity when time seems to flow in slow motion. Maximum effort is extended; things come together effortlessly and in astonishingly effective ways that could never have been planned. A sense of predestination prevails; there is a

> feeling of unity with everything and everyone. Most who have been part of such an experience yearn to relive it and some find it so transforming that life becomes a search for duplicating it.

They go on to write that:

> Organizations that cultivate this level of performance transform the way they operate in the world. They do not allow circumstances to constrain them, but look instead to creating the future and determining their own destinies. They are engaged in daring experiments in organizational innovation that fundamentally alter our understanding of how a group of people can work together.

The five elements which they describe as typical of a metanoic organization (an organization making a fundamental change) are: (1) purposefulness and vision; (2) alignment; (3) personal ability and mastery; (4) attention to organizational design, particularly in relation to how it performs as a system; and an element which is somewhat more complicated but no less crucial, (5) integration of intuition and rationality.

How is this transformation beginning to occur where I work, at Riverside Methodist Hospital in Columbus, Ohio, and how long does it take? I have a perhaps surprisingly specific answer to the second question. It takes five years in an organization our size (4,700 employees and 700 doctors and 23 board members). The answer to the first question is, of course, so complex that it can only be described through a sequence of examples and facts which may, ultimately, be the best teacher because, like a good story, they can serve as a basis from which you can draw your own set of conclusions.

In 1983, when I became president of Riverside Hospital, the organization had 3,800 employees, 550 doctors, revenues of $100 million, and made a "profit" of $6 million. Our funded depreciation (savings account) had $15 million in it and we had a debt of approximately $25 million. In addition to Riverside, we were managing one 60-bed hospital in northern Ohio (Riverside has 1,092 registered beds).

At the end of fiscal year 1987, Riverside was part of a holding company, which I also head, called U.S. Health Corporation. U.S. Health owns and operates seven hospitals with revenues of $300 million; a bottom line of $25 million; an employee group of over 6,000; 1,500 doctors; over 2,000 hospital beds; and a holding-company board of 10 people. By the end of 1987, U.S. Health Corporation had completed the acquisition of three additional hospitals and total revenues

went up to over $400 million, while total beds increased to nearly 3,000. Debt at Riverside increased to $50 million in 1987, but funded depreciation (our savings account) increased to $56 million, meaning that in effect Riverside Hospital could have eliminated its entire debt and still had $6 million left in our "savings account." Operating margins at Riverside were between eight and ten percent and are well above six percent throughout our system.

These cold statistics describe the successful accomplishment of one of our goals: growth. They say nothing about the second principal goal of our organization, the goal which I have been addressing in this paper—fundamental change in the quality of our service to patients. In that respect I would offer the following illustrations and examples.

Around Riverside Hospital there are a series of odd little signs. Next to a mirror in the hallway appears a sign which says "Karl's Mirror"; next to a fan in the dietary department is a sign which says "Helen's fan"; next to a time clock on the ground floor is a small sign which says "Jane's time clock." There are more signs like these and they represent our effort to recognize suggestions which have been offered by our employees. Change comes through a million small steps.

One week I changed out of my blue pin-striped suit into a dishwasher's uniform and worked for several hours in the hospital dishroom. Earlier I had put on the uniform of a linen-services worker and worked for several hours in the hospital laundry. I have worked alongside three different x-ray technicians during the evening shift, and across two shifts as a patient escort, wheeling patients around the hospital. Some of my vice presidents have been doing this too. For years I have sent a personal note and a flower to every single employee who has been hospitalized at Riverside and have visited them when I could.

Every Wednesday and Thursday night during the local news a one-minute "advertisement" appears called the "Riverside Minute." During this sixty seconds a Riverside doctor talks about an aspect of health care. About fifty of our doctors have done "Riverside Minutes." Three other hospitals around the country have purchased this idea from us in the past several months.

Admissions to Riverside Hospital have been increasing steadily.

Although our occupancy remains approximately the same as it was in 1983 (slightly above eighty-one percent), we have approximately 1,000 more employees.

In 1986 the Ohio Kidney Stone Center opened on the campus of Riverside Hospital. The center is a nearly unique partnership between forty physicians and Riverside Hospital. It houses an extracorporeal shock-wave lithotripter (for treatment of kidney stone disease), and is physically no different from dozens of centers like it around the U.S.

The equipment is the same. However, this center is the busiest in the U.S.

On the first floor of Riverside Hospital, at the end of a long corridor draped with streamers, is a door which says "Elizabeth Blackwell Center." Elizabeth Blackwell was America's first woman doctor. Five hundred Columbus-area women have offered their suggestions and thought up this center. It opened in 1985, and in its first two years over 15,000 women and their families had come in for help. The third and fourth floors of Riverside Methodist Hospital are called "The Elizabeth Blackwell Hospital." All the floors in all the patient rooms contain carpeting and eighteenth-century furnishings. The beds have wooden head and footboards and are covered with real bedspreads.

Employee turnover is lower at Riverside than at any other hospital in central Ohio. Recently Hay and Associates conducted a survey of employee morale. Riverside employees ranked first in employee morale among all the hospitals which Hay has tested in the U.S. Yet Riverside ranks about third in a local wage-scale comparison.

Visitors and patients are constantly commenting about the way in which Riverside employees "smile so much."

In the cafeteria is a large board which contains pictures of employees who are described as "Champions of Innovation."

When you walk into the entrance of Riverside's Emergency Room, the first person you see is a nurse who evaluates and sees that you are treated before you are registered. Heart patients who come to Riverside's Emergency Room are admitted directly to the Heart Institute and do not wait in the emergency area.

Riverside has the largest group of volunteers of any hospital in the state of Ohio.

The average attendance at Riverside board meetings is eighty percent.

So many physicians have applied to join the staff at Riverside Hospital in recent years that a moratorium has been placed on staff privileges in the Heart Institute.

In 1987 ground was broken for the only freestanding hospice facility in central Ohio. The facility is being built entirely with contributions from the community. A quarter of a million dollars in gifts came from Riverside employees.

Riverside routinely ranks first (by a large margin) in community surveys as having the best reputation of any hospital in central Ohio.

In spite of the above steps forward, patients still wait too long to be treated. Patients' families still have to wait too long for information about their family members. Nurses have not yet gained enough control over the management of patient care and still have to wait too long for doctors' orders. Individual pain-management systems need to

be improved. Too many patients are still spoken to as if they were six years old instead of sixty years old. Too many employee work areas are cramped, crowded, and not well lit or ventilated. There are not enough windows in the hospital. Lots of employees still watch the clock and wait for the end of their shift. Too many doctors still dodge their own patients. And we have got too many layers of hierarchy.

But we are going to change this. We are going to change because we know that it is the right thing to do and we know we can do it. And we are encouraged even by the small victories. For instance, we now have new "patient gowns." These new gowns were designed not by a consultant, a designer, or me but by one of our nurse managers named Ann Stevens. They are not yet different enough, but they are better.

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This paper was presented during Creativity Week X in 1987. Erie Chapman is still the president of Riverside Hospital and its parent holding company, U.S. Health Corporation. To visit with Erie in his hospital, you must be willing to run after him as you talk. He is constantly in motion visiting with the staff and the patients. You quickly learn that he really does understand the workings of Riverside from a firsthand perspective.

I'm reminded of the recent movie entitled The Doctor *in which William Hurt plays a doctor who becomes a patient in his own hospital. He is then forced to experience his hospital from a new perspective—that of the powerless (and sometimes scared) patient. Erie has very effectively described this anxious state in this paper.*

The paper also shows that bringing a new perspective to an old situation often results in innovation. Erie's degree is in law—not hospital administration—and I wonder if this has proved to be an advantage in his restructuring the old, well-known situations at Riverside and in his establishing a process of continuous innovation. ***SSG.***

Fostering Creativity and Innovation in a New-Product Research Group

Richard F. Wright

I once had the good fortune to manage a growing new-product research group as it developed a new and exciting technology from idea conception to the beginning of pilot production. It is not very often that one manager has an opportunity to experiment with techniques in team-building, motivation, creativity development, and group goal-setting with essentially a control group, during the lifetime of a single new-product research project. I shall present in this paper an outline of those key factors which I believe fostered a high level of group performance. My focus will be on five key elements of a group structure which in my view encourages innovation and creative thinking and minimizes the fear of failure. I will include personal accounts of specific events in order to illustrate the concepts presented.

Group Effectiveness

It is interesting to consider how the group I managed (the Advanced Product Development Group of Mead Imaging) got its start. While the group existed prior to 1981, it really began to grow when an idea was developed by a stereotypical inventor who wasn't even a group member. This fellow (I will call him Sam) was considered difficult to manage, hard to get along with, but very "creative." He was working in a technical service group when I met him and hating every minute of it. He had managed, however, to sneak some experimental time to work on his latest new idea, a non-silver, dry-developed imaging material. He had a crude but very interesting picture which he had made with his process but he wasn't sure what to do with it. There was no prior history of imaging research at our laboratory and no one was overly excited about his result. His manager, furthermore, would rather have had him concentrate more on his job responsibilities and less on his inventing.

Sam and I talked, and I got very excited. My background, before joining the firm, had been in imaging systems. I saw great potential in Sam's idea and supported it enthusiastically. My boss also was inter-

ested, and between us we convinced our management to support an active research effort to develop the process further. Sam joined my group and the project was underway.

It is interesting to note that the key idea came from an individual, as it almost always does, but it had to have a group of people to turn it into something useful. This combination of facts—the individuality that often leads to the creative insight and the need for group effort which can, without great care, stifle individual contribution—is, I believe, the key to successful research management. Bradford and Cohen (1984, p. 286) state:

> Groups can be dangerous forces toward conformity in thought and behavior. Too many people experience their organizations as constraining. But groups can also support individuality. As a team develops, it moves from a collection of individuals who are suspicious of each other (and therefore want to limit differences among themselves) into a cohesive but consensual group where individual differences are valued and supported. A genuinely collaborative team can allow more diversity and autonomy than one that clings together for mutually distrustful motives.

My experience with APD supports this view. Effective teams can be assembled and individual creativity can be fostered in an effective team environment. David Campbell presents this synthesis of individual creativity and group consensus in a graphic way in his book *Take the Road to Creativity and Get Off Your Dead End* (Figure 1). The individual creative actions are represented by many short, sometimes disjointed arrows but the general thrust of the effort is in the direction of the bold arrow. This bold arrow represents the goal of the effort, the direction in which the work hopefully will flow. This bold arrow can be developed consensually, and with strong leadership can be followed without prohibiting the kind of creative meandering which might lead to new innovations with even more potential than the original. This, I believe, has been the history of APD.

Management Style—"Management by Walking Around"

When I read *In Search of Excellence* by Tom Peters and Bob Waterman, I was intrigued by much of what their research had shown. I was especially interested in their discussion of the Hewlett-Packard Corporation and its philosophy of "management by walking around." I liked the concept because my experience so directly reinforces their conclusions. I cannot understand how a manager can sit in

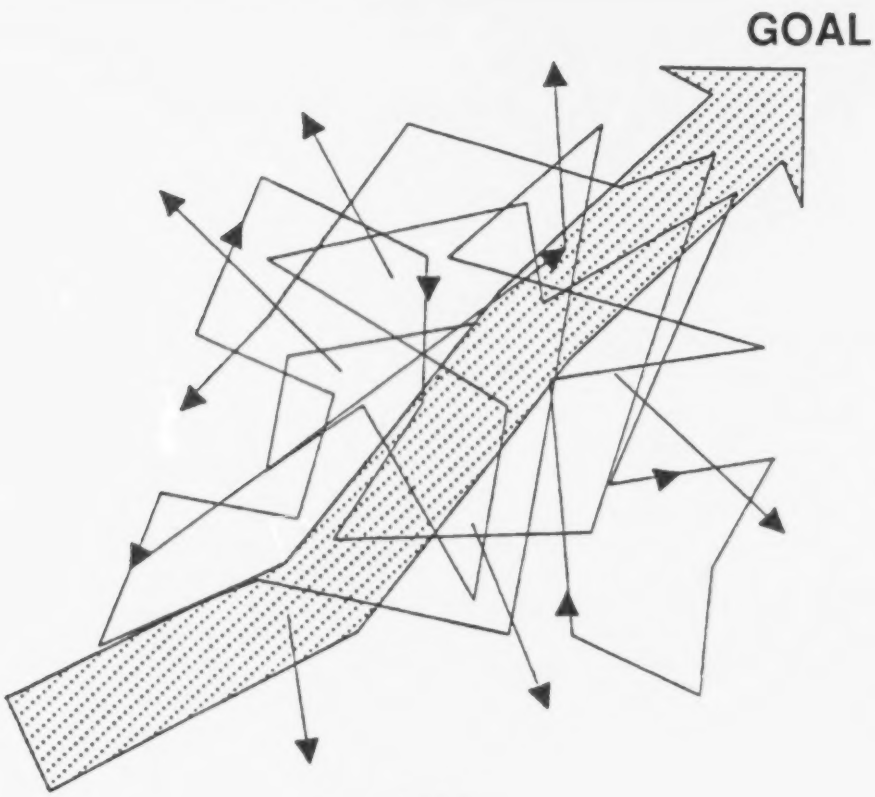

Figure 1

an office for eight hours and shuffle papers, make phone calls, read and write memos, and expect to build a high-performing team. My philosophy of management is simple: Spend the major portion of your time with your subordinates on *their* turf. Listen and be involved but don't meddle. Only in this way can you truly expect to understand what they see as key issues, what is *really* involved in various project activities, and especially how people do or do not work together.

I remember one of the first important lessons I learned while managing APD. The group had grown to twenty scientists and technicians, and we had assigned several project leaders to work in specific problem areas. I decided that my constant appearances in the labs and hallways might be in some way getting in the way of what I hoped would be the future "leaders" of the group, who now were learning how to run their own project teams. I didn't want to appear to them to be meddling. With great reluctance I started to spend more time in my office and less in the laboratory area.

Within two weeks I was approached by several members of the group, including the project team leaders. "What's the problem?" I was asked. "You quitting or something? Where have you been? Don't you care anymore about the project?" I couldn't fully comprehend the impact of my decision. They hadn't seen me as meddling at all. In fact, they truly enjoyed the daily contact with me. They appreciated the interaction and discussions that took place in our hallways and wanted nothing to do with my new "style." Even the technicians, who were typically more difficult to communicate with than the staff, were very supportive of my visits to the laboratory area. Needless to say, I returned to my former practice.

The group actually developed a new working style as the months passed and our number swelled to thirty-six. Since I spent so much time in the hallways, informal meetings would often be held. The group actually became noted for their "hallway meetings" and it became part of the APD "culture" which was very important to maintaining positive group identity. No one ever accused APD management of not keeping them informed. You could find out anything about group issues out in the hallway any day of the week.

Another interesting effect of the walking-around mentality was its impact on group communications generally. Since I shared so openly, others began to do the same. Even technicians began to open up, to communicate more directly with their supervisors and me. The scientists shared their project work without concerning themselves with issues of turf. To openly share ideas and concerns became the norm.

In Figure 2 I summarize "management by walking around" as I have experienced it. I have noted four key "don'ts" for research managers which I believe are very important. Managers are by definition in positions of authority and their statements can sometimes be taken by subordinates as "truth" or at least as decrees. The manager has a heavy responsibility therefore to manage his words as well as his group. If high performance is expected from people, they must be allowed to express themselves openly, to pursue their own ideas vigorously, and to expect that disagreement and conflict among themselves and their management will be fairly and honestly resolved. They must also expect that this resolution will not always be in favor of the boss. The walking-around style allows this to happen in a natural way and it diminishes the dangers of missed communication.

In Figure 3 I present the "fine lines" that I had to be aware of as I attempted to foster a highly communicative style in my group. I show, for example, disagreeing and forbidding. As mentioned above, a manager's position of authority can lead to misunderstanding. I have actually experienced situations where, as part of a discussion on an

MANAGEMENT BY WALKING AROUND

Get out and mingle . . . Be at the front lines . . .
Get excited . . . Disagree . . . Allow disagreement . . .

BUT

Don't prejudge.
Don't direct experimentation. (Let scientists be scientists.)
Don't criticize in front of others.

AND ESPECIALLY

Be wrong sometimes!

Figure 2

FINE LINES FOR RESEARCH MANAGERS

Disagreeing — Forbidding

Involving Oneself — Being a Pest

Suggesting — Demanding

Praising Individual Success — Demeaning Other Contributors

Figure 3

experiment, I disagreed with the specific focus of the work. I did not reject it but only presented my point of view as a colleague. Several of the younger staff, however, saw my disagreeing as forbidding and stopped their work in this area. As it turned out, I was wrong, they

were right and the work was delayed. This was an important lesson for me and I try to be constantly on the alert for possible misunderstandings and, more importantly, for instances where I actually cross the line.

It is interesting that this style seemed to work well even as we grew to more than fifty. It is also interesting that it worked even as the make-up of the group shifted from a primarily young, inexperienced staff of chemists, to a more heterogeneous mix of different age groups and professions (see Table 1).

Table 1.

Year	No. of Employees		Average Age	Average No. of Years Experience	Education Beyond High School
1980	Professional	3	37	7	7
	Technicians	3	42	20	—
1982	Professional	15	34.9	8.8	5.2
	Technicians	20	38	12	—
1984	Professional	27	33.8	7.4	5.8
	Technicians	25	40.4	12.8	—

Handling Conflict—"It's OK to Disagree With the Boss, or Anyone Else"

Throughout my many years in laboratory settings, I have noted the tendency for people to conform to certain implied or stated norms. The most obvious of these is the classic, "Don't rock the boat."

Because so many people adhere to these norms, those who do not adhere stand out in stark contrast. The result is that they get certain labels applied to them like "strange," "kook," and even "creative." (There sometimes is a tendency to label the boat-rocker as creative regardless of whether he or she has ever really done anything new or different.)

I like to think that there is within most people, especially researchers, the desire to be a little different from others and the desire to contribute and have that contribution recognized. But too often we place people in organizational structures that suppress these desires

and make it more profitable for them merely to conform. The style of management in such groups, I believe, is the key to such outcomes. If the boss is autocratic and always right, there is no obvious economic or personal gain in taking chances or making waves. If, on the other hand, the boss is sometimes wrong and admits it, if there is a clear and unequivocal commitment to sharing responsibility within the group, then there is no benefit to be gained by keeping quiet when you disagree.

My desire was to develop a different norm within APD. I wanted a team that worked well together, but at the same time I wanted people to be free to openly disagree with each other and with me. I wanted people to find ways to develop their own styles and yet build a team philosophy which would allow us to find, in a consensual way, what the key issues were, what our primary goals should be, and how we could best resolve these issues and reach our goals.

When I speak of conflict, I am focusing on the general issues associated with the relationships between people and their ideas. These relationships tend to be based, in my experience, on the need for people to feel that they are worthwhile and that their ideas are worthwhile. When they perceive that their ideas are being challenged, they project this challenge of their ideas onto their self-esteem and become hostile. In a research environment, however, this defensiveness cannot

be tolerated. People must develop a sense of what science is about and be willing to accept debate, differences, and even argument as part of the process. My job, then, as manager was to create an atmosphere within APD which treated conflict and creative conflict resolution as the norm.

The problem with conflict, when it comes to differences in ideas, seems to me to be related to our tendency to get off the subject of the debate (the difference in our ideas) and to project the arguments onto our personalities; we get personal and attack each other instead of our ideas. Eliminating this response requires constant attention. As manager of APD, I started very early fostering a questioning mentality among group members. I got them used to debate on technical issues. I supported my views tenaciously but accepted being wrong with a smile and with as much light-heartedness as I could muster. By the time APD had grown to thirty, our culture included this concept. Once again, we were viewed by the rest of the building as a group that constantly disagreed with each other, fought in the hallways and in meetings, and yet we always seemed to have fun and we got things done.

As I consider my time as manager of APD and try to isolate the key elements of success in our group, I have to believe that our ability to deal with issues directly, to fight for what each individual thought was right, and to accept each other as human beings and not just managers and scientists and technicians was as important to our success as anything else. We thought of each other as people, not just superiors and subordinates. Part of the natural working relationship included concern for each other.

Maintaining Open Communication— "I Know How to Solve Your Problem"

I agree wholeheartedly with the concept that individuals generate great new ideas. I also agree wholeheartedly with the concept that organizations are needed to turn ideas into useful innovations. As we formed APD and as it grew, many different skills were added to our group. When we were only six people, we all knew what was going on in the group. Everyone interacted with everyone else. As we grew to fifty, the issue of communication became more complex. I must say that communicating in a group setting does not necessarily mean having a meeting. My experience would support the view that meetings, while important, are probably less effective as communication tools than more informal means.

If anyone were to ask me why communication among members of our project team is important, I would answer: "No one member of our group has all the answers, but at any one time, on any key issue, someone has an important and perhaps vital contribution to make. If I don't take advantage of this input, then I am being dumb." But why have so many groups failed to develop good communication techniques and channels? In my experience the answer is less complex than might be expected. In simple terms, people tend to act with self-interest when they don't trust those with whom they are expected to interact. Within organizations, this overriding self-interest can be stifling.

My approach to communications involved several elements: (1) Set an example—communicate everything that I know and above all be absolutely honest. (2) Emphasize informal structures and minimize long meetings. (3) Force cross-group communication by creating a "task force" format which minimizes or even eliminates bureaucratic structures. (4) Keep people talking all the time so that when issues develop they are accustomed to dealing with them. (5) Use group meetings and seminars to give people an opportunity to present their work and receive positive and negative feedback. (6) Hold group-wide, off-site meetings twice a year to develop goals, emphasize priorities, and, most importantly, build group identity and reinforce our culture.

Of all of the above, I believe that the first is the most vital. If mistrust is the key barrier to communication, then it must be eliminated. No meeting structure or forced system of any kind will cause effective communication to take place if people question each other's motives. If they question my motives, and if they don't feel that I am communicating honestly and openly, then they will not attempt to develop communication among themselves.

The history of APD is in fact replete with examples of honest communication and sharing of ideas. I never had to force people to talk to each other. One example, I believe, presents the best perspective on our group communication mentality.

As we became more convinced of the potential of our new invention, our management began to develop a plan to build a manufacturing organization. The first step in this process involved hiring a skilled engineer with experience in operations and scale-up. The process-development section of our group had been responsible for the pilot production operations up to this point and had a great deal of specific knowledge in this area. It was necessary for our new colleague, who ultimately would become production manager, to learn from our process-development engineers.

Several months after arriving in the laboratory, I was talking with our new production manager about his experiences on joining our

team, and he said, "I never felt like an outsider. From the first day, I was welcomed into the group. I was given information on every aspect of the process. I was invited to group meetings and my suggestions were solicited. This was not a phony attempt to make me feel good; it was legitimate sharing of information. I never experienced such an open and totally transparent organization."

I don't want to give the impression that our group emphasis on communication was in some way intended to eliminate individual contribution. In fact, this constant emphasis on people talking to people seems to foster individual invention and innovation. Most inventions originate in the mind of an individual but require refinement before they become practical. Refinement can be accelerated if the original idea is shared with colleagues who can offer an honest critique. This only happens where trust is a key element of the organization. When you know that you can openly share your great new idea with your colleagues and your boss without being laughed at or, worse, having it stolen, then you will be willing to try new things, to be an inventor, and, most importantly, to be unafraid to try and even to fail.

Group Goal Setting—"The Buying-in Process"

I have already mentioned the importance of the group in turning new ideas into useful products. In high-technology endeavors, this is especially true. High-tech problems tend to be very complex. Because of this complexity, multidiscipline groups are assembled to attack the problem. The question then becomes, "What is the problem?" This may sound silly, but my experience reinforces the belief that clearly defining the key problem or issue to be solved is of fundamental importance. The question that any individual or group of individuals involved in new-product research should ask is, "What is my goal?"

I believe that APD succeeds at what it does because everyone has a chance to contribute to the setting of their own goals. I don't believe that goals by themselves are really significant, but in the process of goal-setting, the individual communicates with colleagues, understands the purpose of the effort, and identifies those areas of expertise which must be drawn into the project if it is to be successful. I don't believe that management-by-objectives works in research. In MBO systems, at least as I have experienced them, the emphasis seems to be on the objective, to the exclusion of the effort which was made to reach the objective. In a research setting this tends to lead to safe goals rather than the "stretch" goals which are to be preferred.

I view goal-setting primarily as a communication tool. It fosters a buying-in attitude among the members of the group and makes it relatively easy to generate enthusiasm for tasks. When every member of the group has a say in what it is trying to accomplish, and feels free to offer criticism or support for particular points of view, then they feel like the group's goals truly are their own. It might be said that we are not really establishing a climate for individual creativity when we focus individual effort so completely on group goals. I would only say that when individuals have a clear view of where they are going, and when an atmosphere of trust, risk-taking, and open communication exists, then the creative impulse can be encouraged. It takes many creative impulses to build a complex, new technology.

Performance Appraisal—"A Real-time Process"

I left performance appraisal for the end of my paper because it is by far the most difficult topic for me to address. I have read a substantial number of articles and books on the subject but have come to no definitive conclusions. The complexity of the issue is almost overwhelming and has apparently troubled organizational-development professionals for many years.

I believe that discussions of individual performance should be part of the ongoing process of communicating. These discussions should be two-way and should involve specific suggestions for action. The concept of "shared expectations" is especially attractive to me. When both parties understand clearly what they expect of each other, then evaluation becomes relatively straightforward. I also believe that in a research setting, care must be taken to discriminate between the goal and the effort to achieve the goal. Again, I have a fear of MBO in the laboratory.

Since our primary effort was focused on building a high-performing group, the evaluation of individuals could not easily be separated from the group activities. If the group performed well, and all were expected to have been part of the group, then were all the members good performers? This is a complicated and difficult question without a simple answer. It is at least reasonable, however, to assume that a real-time, ongoing review of expectations versus performance would keep both the evaluator and the evaluated on the same wave length.

If I had to propose a program for evaluation that I felt was best for my organization, I would begin by squirming in my seat uncomfortably. I would then propose that any attempt to measure performance

in some analytical way is both counterproductive and impossible. I would say that a better approach would be to allow the long-term success of the team to speak for itself. Give appropriate raises at regular intervals to all members of the team but reserve incentive bonuses for the outstanding performers. These individuals will be clearly recognizable as the project proceeds. I have had no problem recognizing developing leaders in my group and have given them more responsibility and (insofar as I could) more substantial monetary rewards. The key is that I am in daily contact with these people and know exactly what their contributions have been.

Conclusions

David Campbell (1977, pp. 87-99) has listed seven blocks to creativity in organizations. Two of these, *A Preoccupation with Order and Tradition* and *A Reluctance to Play,* seem to me to be the most pertinent in laboratory settings. We have attempted in APD to minimize hierarchy and maximize intergroup activities. We have also tried to do things in different ways, ways which lead to loosely structured teams and a lot of argument and laughter. The success of our organization has been encouraging. It has reinforced in my mind the idea that people are fundamentally fun, creative, and interested in each other. At the same time I have seen that people are, at their core, not very rational. In fact, people are an interesting study in conflict and paradox. Peters and Waterman (1982, pp. 55-56) state beautifully what I fully believe is true.

> To understand why excellent [organizations] . . . are so effective in engendering both commitment and regular innovation from [many] . . . people, we have to take into account the way they deal with the following contradictions that are built into human nature:
>
> 1. All of us are self-centered, suckers for a bit of praise, and generally like to think of ourselves as winners. But the fact of the matter is that our talents are distributed normally—none of us is really as good as he or she would like to think, but rubbing our noses daily in that reality doesn't do us a bit of good.
>
> 2. Our imaginative, symbolic right brain is at least as important as our rational, deductive left. We reason by stories *at least*

as often as with good data. "Does it feel right?" counts for more than "Does it add up?" or "Can I prove it?"

3. As information processors, we are simultaneously flawed and wonderful. On the one hand, we can hold explicitly in mind, at most a half dozen or so facts at one time. Hence, there should be an enormous pressure on managements—of complex organizations especially—to keep things very simple indeed. On the other hand, our unconscious mind is powerful, accumulating a vast storehouse of patterns, if we let it. Experience is an excellent teacher; yet most businessmen seem to undervalue it. . . .

4. We are creatures of our environment, very sensitive and responsive to external rewards and punishment. We are also strongly driven from within, self-motivated.

5. We act as if express beliefs are important, yet action speaks louder than words. One cannot, it turns out, fool any of the people any of the time. They watch for patterns in our most minute actions, and are wise enough to distrust words that in any way mismatch our deeds.

6. We desperately need meaning in our lives and will sacrifice a great deal to institutions that will provide meaning for us. We simultaneously need independence, to feel as though we are in charge of our destinies, and to have the ability to stick out.

Now, how do we deal with these conflicts?

I believe that we begin by developing, as we have in APD, a culture. This culture should come about as a natural result of people dealing with people in an open and honest way. Integrity must be the starting point and high performance must be the goal.

I used the word *culture* several times earlier in this paper. The idea that groups or companies develop a culture has been presented in several theories of management including William Ouchi's (1981) Theory Z:

> Organizational culture consists of a set of symbols, ceremonies and myths that communicate the underlying values and beliefs of that organization to its employees. These rituals put flesh on what would otherwise be sparse and abstract ideas, bringing

them to life in a way that has meaning and impact for a new employee.

As I watched the APD group grow, it became clear to me that this concept is very important and very real. As we developed as a group with our own way of doing things, and with our own style of interactions, goal-setting and conflict resolution, we began to get a reputation in the central research facility in which we were only a part. We were different and strange but we had fun and we got results. To me, however, the key element was that people in APD were proud of their membership in what to them was a very special group.

Acknowledgement

I would like to thank Dr. Dale R. Shackle for allowing me to "do my thing" with the APD group and for always being supportive. I want to especially thank the members of APD who were always fun, always enthusiastic, and, most importantly, always themselves.

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My first meeting with Dick Wright was in Chillicothe, Ohio, at the first of a series of seminars on creative leadership that I was giving at Mead Central Research. One of his comments was particularly memorable. He said that he had not received his education as a student at university; instead, he had received it at Polaroid where his job made it possible for him to follow Edwin Land around for ten years and observe the process of innovation.

Dick had just left Polaroid to lead a soon-to-be-formulated Advanced Product Division for Mead. His first assignment was to find out what inside-the-lab ideas had product potential. I was also impressed with the organization's recognition that creativity existed inside that

laboratory; they did not see a need to start afresh. Mead's management assumed that a new leader from the outside would be able to explore internally and see potential products that people before Dick had missed because they were concentrating on managing the lab activity.

I don't want to give the impression, however, that Dick wasn't interested in management. When I talked with him I saw immediately that he was passionate about managing the people process. Despite his fascination with and understanding of technology, I perceived that he would give the nod to the importance of the people-process side of new-product development and research.

I gave eighteen seminars over a period of thirty months, and during that time I witnessed Dick finding individual contributors and nurturing them, encouraging those ideas that, although they may have initially appeared to be half-baked, had high potential. Then he would expertly draw together a team around those ideas and build excitement about the projects.

Dick's team meetings would often take place standing in the hallway. These team conferences were matter-of-fact, relaxed, and oriented toward problem solving. He encouraged team members, providing a certain freedom to take risks. I think that you can sense the flavor of his management style in this article.

Using these skills, Dick took an idea to the marketplace in a very short time and introduced an imaging technology that subsequently spun off into a new company. I hope you enjoy his description of that process. ***SSG.***

Creative Problem Solving

David C. Morrison

The objectives of this article are: to inform the reader of the high need for creativity in our personal and professional lives; to increase the reader's awareness of some of the behaviors and conditioning that affect the creativity in ourselves and others; to share with the reader a working definition of creativity and creative problem solving and how to put these skills of mind to practical use; to introduce some specific techniques that will enable the reader to improve his or her own creative thinking skills; and to show the reader how focusing our thought processes combined with a systematic approach to problem solving can help us make positive change in our lives.

Creativity is crucial for business today. Robert W. VanCamp, President and CEO of R. J. Reynolds Development Company, has said:

> The survival skills of the nineties will be different. In a word, the most important skill is *adaptability*. The successful people, from now on—the leaders—will be the first to see change, and the earliest to adapt to it. The losers will be those who seek the old comfortable constancy. . . . And the successful manager will be one who can build an environment where creativity is encouraged—even demanded.[1]

When I use the word *organization* here, I am using it in its broadest sense, to include everything from an individual to any group of people that assemble, communicate, and work together for some common purpose. Therefore, it refers to both profit and nonprofit groups. Paul E. Mott wrote about adaptability in 1972 in his book *The Characteristics of Effective Organizations*. Mott found the following three characteristics common among what he considered effective organizations:

Efficiency. Efficiency is organizing for routine production. On a personal level, routine includes everything from how we get up in the morning, shower, dress, etc., to the set of patterns we use to communicate and relate to each other. Routines in our professional world include those series of steps to acquire, manufacture, distribute, market, and sell products. In the professional world, routines are in

place to deliver a high quantity and a high quality of product or service.

Adaptability. Adaptability is organizing to change routines. In order to change routines, an organization must be aware of and in touch with their set of routines. Also, they must have a desire or motivation to change routines. This motivation can come from anticipating problems or changes and reacting to them. Adaptability in the professional world particularly requires that one stay abreast of new methods and technology applicable to the activities of that organization. Adaptability also requires that new methods or routines are sought out, accepted, and implemented once found.

Flexibility. Flexibility is organizing to cope with temporary, unpredictable overloads or emergencies. On a personal level, flexibility comes into play when we have a flat tire or must take care of the children when they are sick. On a professional level, flexibility comes into play when dealing with work stoppages, absenteeism, fuel shortages, raw material shortages, etc.

If one takes a hard look at organizations today it would seem that adaptability efforts tend to take a back seat to efficiency efforts. Costs, quality, quantity, and "the checkbook balance" are our measures of performance and the outcomes we typically focus upon. How

VERY GOOD! WE HAVE REVIEWED THE COMMANDMENTS AND THE UPDATES TO THE LAST EFFICIENCY PROCEDURES. ANY QUICK THOUGHTS ON ADAPTABILITY AND FLEXIBILITY?
? ? ?

we get these numbers or outcomes, i.e., our set of routines, rarely seems to be the focus of our attention. Our first question tends to be, "What is the number?" and not, "How did we get the number?" Most organizations track their efficiencies very closely and may not even know how to track their adaptability efforts. If an organization is to be effective, then the key question must be, "How might we get our adaptability efforts in line (or in balance) with our efficiency and flexibility efforts?"

To operate in the 1990s, organizations must become more adaptable so they can handle the rapid rate of change, the more complex systems, and the increasing demands of customers and other organizations.

Applied creativity is a necessary tool to help an organization balance its adaptability and efficiency efforts. The likely challenge for an old, established industry which has probably "ironed out efficiency problems" is to be more adaptable. Creative problem solving (CPS) can help. The most likely challenge for a new, emerging industry is to better establish its routines and be more efficient. Depending on the industry, the competitive environment, and all of the surrounding circumstances, applied creativity is necessary to get an organization what it needs to be successful. Growth and change are inevitable. The question is, "Are you proactive and creating what you want?" or "Are you reactive to what is happening around you?"

Figure 1 shows where an established, traditional organization might be: high in efficiency and low on adaptability. Applied CPS can help this organization find and solve problems to help it be more adaptable.

Figure 1

CPS, which can be defined as a set of tools or methods which an individual or organization can use to approach a problem or challenge and make effective changes, can help individuals and organizations to be more adaptable. This approach requires that the creativity of individuals be used.

Making use of the creativity of an individual is not necessarily an easy task. The average adult probably uses only a fraction of his or her creative ability. People tend to let things happen instead of making them happen because it is a more comfortable, risk-free way of doing things. But there is abundant research showing that everyone has the basic ability to be creative, and that everyone's creativity can be enhanced. Given the rapidly changing environment of the 1990s, being adaptable will require individuals to be proactive versus comfortably reactive.

Let me offer the following definition of creativity:

Creativity = Knowledge x Imagination x Evaluation

Innovation = Creativity x Action

It is valid to argue that you cannot truly have creativity without taking action. In this case creativity and innovation are synonymous. Therefore:

Creativity = Knowledge x Imagination x Evaluation x Action

Just as with any equation, if knowledge, imagination, evaluation, or action is equal to zero, then creativity would equal zero.

To effectively use the concept that creativity is made up of some combination of knowledge, imagination, evaluation, and action, it is helpful to have a process. As Peter Drucker (1968, p. 35) says, "Entrepreneurs [must] . . . learn to *practice systematic innovations.*"

Let's first address the imagination and evaluation parts of creativity (see Figure 2). Consider that the brain has four basic functions; it must: *absorb,* use the five senses to take in information; *retain,* log, hold, and recall information; *diverge,* use knowledge and imagination to generate facts, challenges, ideas, and action steps; and *converge,* use logic and judgment to evaluate alternatives.

Many people believe that creativity is our ability to do only divergent thinking. Creativity actually involves both divergent and convergent thinking. Unfortunately, our brains do not diverge and converge very well at the same time. Try finding one hundred different ways to improve a pencil while stopping after each new idea and evaluating it. After three hours and fifteen ideas have been discussed,

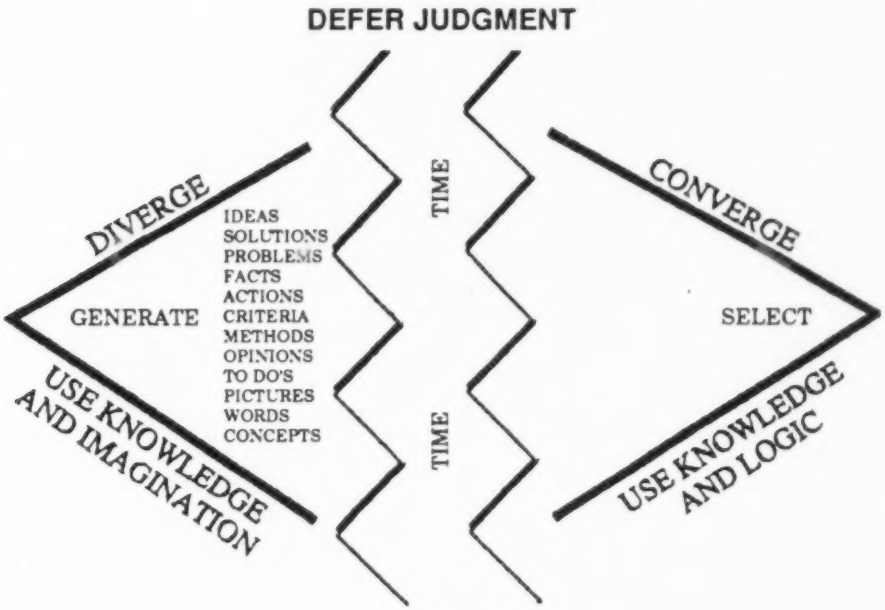

Figure 2

the remaining eighty-five ideas will be hard to find. Said another way, trying to diverge and converge at the same time is like trying to drive with your brakes on. You will burn up lots of energy and go nowhere (see Figure 3).

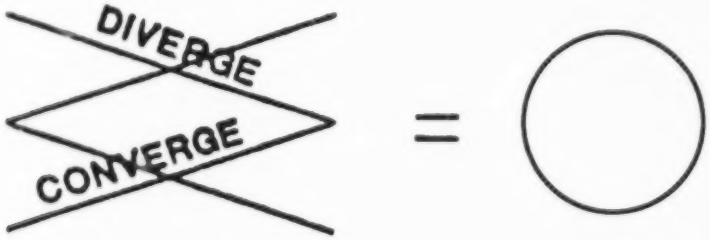

Figure 3. ***Trying to diverge and converge at the same time yields nothing***

Instead of diverging and converging at the same time, if we separate these activities or ways of thinking, we should end up with a better overall output. The best way to have a good idea is to have lots of ideas. Said another way, if we are good divergent thinkers and we

can use our imagination to come up with many possibilities, then our chance of having better alternatives is improved.

One unfortunate thing about being an adult is that we have been highly conditioned to use our skills of logic and evaluation. As a result, we have lost much of our ability to use our imagination and therefore our ability to generate options. Our ideation-evaluation process looks more like that shown in Figure 4.

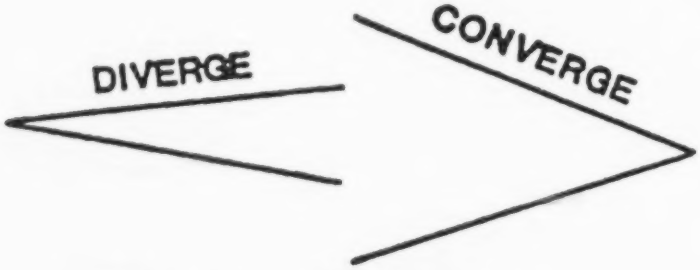

Figure 4. ***Divergence-convergence out of balance***

We are conditioned to think convergently for many reasons: We get rewarded for the decisions we make, i.e., the alternatives we select. We get rewarded for coming up with the answer the boss wants. We must make quick decisions and no time is allowed for looking for alternatives. Since we started our educational process, we were conditioned to look for that one correct answer versus finding many possible answers. (What percent of all questions that you had in school had one and only one answer? If you went to a technical school, the percentage must be above 95 percent.) To perform well in school, we learned to be good convergent thinkers.

To improve your ability to diverge or use your imagination, the following guidelines will help:

1. Do not use evaluation or logical thinking, defer judgment.
2. Strive to get a high quantity of ideas.
3. Strive to maintain an uninterrupted stream of ideas.
4. Dream up radical, impossible or blue-sky ideas.
5. Build on existing ideas; change or improve ideas to create more.

6. Visualize or think in pictures and use your five senses to find more possibilities.

7. Relax and think that any idea is a good idea. Quantity, not quality, is the goal.

For individuals to improve their ability to think divergently, practice and patience are required. Many years of conditioning and thinking cannot be changed quickly. For many whose thinking ability has been out of balance for a long period of time, getting these skills of divergence and convergence in balance again will take a concentrated effort. An example may help. Pretend your right arm and left arm are equally strong and flexible. If you break your right arm and it is placed in a cast for eight weeks, it will no longer be equivalent in strength and flexibility to your left arm. Our skill or ability to use our imagination has been "put in a cast" as we have grown into adulthood. Please note that balancing thinking skills will not be easy if the environment and people continue to emphasize and reward only convergent thinking.

Particular importance should be placed on the fact that creativity takes both divergent and convergent thinking. If an individual has a highly divergent and imaginative mind but is not skilled at convergence or skillfully evaluating, the final results can still suffer (see Figure 5).

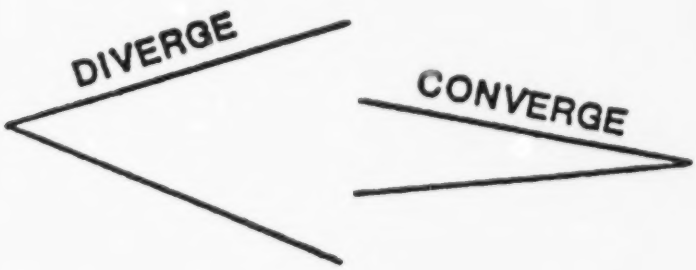

Figure 5. ***Divergence-convergence out of balance***

The key for helping most people balance their ability to do divergent and convergent thinking is improving one's ability to defer judgment. Deferring judgment does not mean that judging or evaluation will not occur. It only means that during the ideation or divergent process your judgment and evaluation are suspended or withheld until many facts, challenges, or alternatives are generated. Once you have many possible options, then, and only then, is it time to evaluate.

Having the skills of divergent and convergent thinking is not enough to be creative and make change occur. As the definition of creativity offers, knowledge and action must be added to our skills of imagination and evaluation in order for creativity to unfold. Creative problem solving is one vehicle or tool which allows these necessary ingredients to come together to enable us to make change. Having only the skills of divergent and convergent thinking is like having a thousand gallons of gasoline. You can make a lot of smoke and fire but you cannot go anywhere. Creative problem solving as a tool is like having the vehicle in which to pour the gasoline.

For making change and solving problems, the problem-solving model, which requires the use of knowledge and ends in implementation, in Figure 6 is offered.

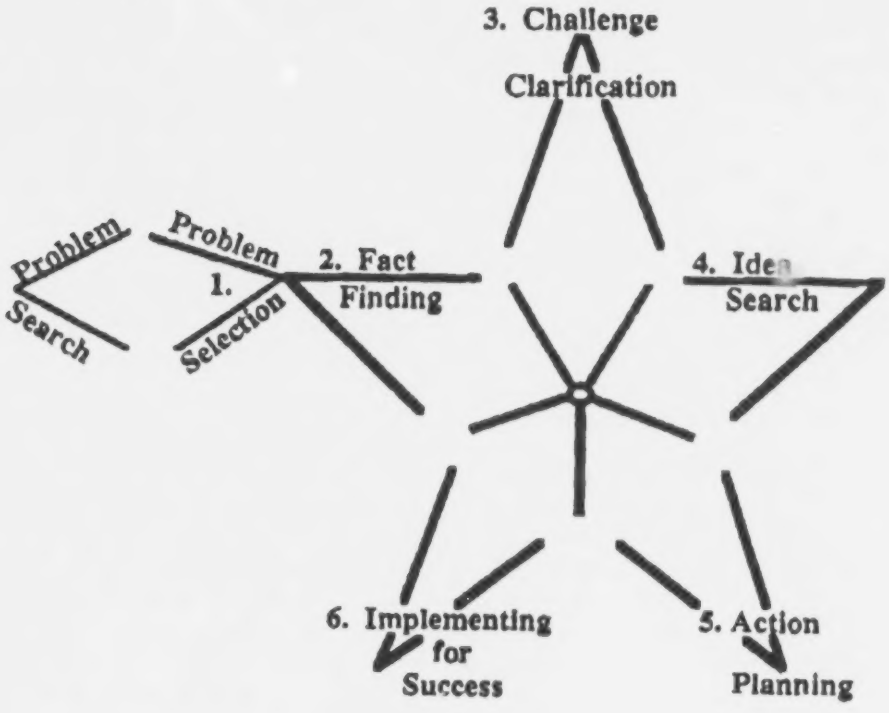

Figure 6

Notice in the problem-solving model in Figure 6 that there is a divergent and convergent symbol (< >) that makes up each step of the

model. By using the power of divergent and convergent thinking step, an individual or group can fully tap their thinking to its full potential—being creative and logical as they use a structured process to address any problem.

This creative problem-solving model works as follows:

STEP 1: Problem Finding

Diverge: Here an individual (or group) will generate a list of problems, situations, challenges, or goals that they might have.

Converge: Pick a problem that the individual (or group) wants to work on and has the skills, decision-making capability, power, energy, and ability to solve.

STEP 2: Fact Finding

Diverge: List facts that the individual (or group) knows about the situation. Consider facts about what you do not know but wish you did, or facts about what you have already tried. Try to generate facts drawing upon many different points of view. A CEO, hourly employee, husband, or wife may often see the same problem from different perspectives. Remember, quantity breeds quality.

Converge: Pick what you think are five to nine key facts about your situation. Again, remember to draw upon different points of view.

STEP 3: Challenge Clarification

Diverge: Look at your key facts and generate a list of challenge statements using "How might we . . .?" For example: Fact: Our labor cost is $8 per unit. Challenges: How might we reduce our labor cost below $8 per unit? How might we use fewer people? How might we increase our output per person?

Taking any challenge statement and asking "What's stopping you from . . .?" or "Why do you want to . . .?" may yield alternative challenges that you had not considered. This questioning technique is another divergent thinking tool.

Converge: Pick a problem statement or challenge that most clearly states your problem. If you have asked the question, "What's stopping you from . . . ?"; gotten answers; and then created a new challenge statement, you have identified possible root causes or subproblems. Identifying these root causes helps to clarify the real challenge. A problem well stated is half solved.

STEP 4: Idea Search

Diverge: List alternative ways to solve the problem you selected. Go for quantity, not quality, and use the guidelines for effective divergence.

Converge: Pick one, or as many as possible, of the best alternatives that will help solve your problem. The number of solutions you pick may vary for each problem you try to solve. If each solution is expensive, you may only pick one to implement. If solutions are not expensive and you have the resources to implement many, then pick the most feasible solutions.

STEP 5: Action Plan

Diverge: Generate a list of action steps necessary to put the idea(s) into use.

Converge: Determine the order in which the action steps must be carried out. Determine who should do each action step and when it will be completed.

STEP 6: Implementing for Success

Implementation may require the use of many diverse tools to push your solutions through the system to be successful. Some of the implementation tools to consider are: determining the project value (in dollars per year); conducting a shareholder analysis to determine who will gain or lose by the implementation of your solutions; developing a selling plan for your solutions—ideas are harder to sell than products or services; developing a tracking system to check and monitor progress; developing a plan on how to reward for success/failure; and anticipating any possible difficulty and proactively planning for any problems when implementing.

Diverge: The skill of divergent thinking can be used with any of the implementation tools listed above. For example: To determine project value, diverge a list of benefits to your solution(s). To determine positive/negative stakeholder, diverge a list of people who will be affected positively or negatively by the implementation of your solution(s).

Converge: The skill of convergence can be used with any of the implementation tools. To determine project value or put any plan together will require the use of logic and judgment.

Note

[1]These remarks were given as a part of a commencement address for the Babcock Graduate School of Management at Wake Forest University on May 20, 1984.

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Dave Morrison is a creativity practitioner. For many years he practiced inside Frito-Lay—an organization where he had a variety of rich experiences that would serve him well both as an internal and external consultant. He is an engineer by training who has invested time attending various creativity training programs provided by the Creative Education Foundation and the Center for Creative Leadership.

Dave had to live creativity within the company, and it was these experiences and his teaching ability that attracted us. We heard him present in other settings, and the message was such that we knew we had to have him for Creativity Week X in 1987. His real-world experience helped provide the balance to the academics who took part.

Eventually Dave served as an adjunct faculty member for the Center's courses on implementing innovation and effecting change. Today, he is an independent consultant and partner in the consulting firm Involvement Systems, Inc., in Dallas, Texas. ***SSG and DAH.***
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Delivering Managed Service

Ron Zemke

We live and work in a service-centered economy, an economy dominated by industries that perform rather than produce. Seventy percent of the jobs and sixty percent of the GNP come from the service sector. Services are America's most profitable export, the gold and the growth of the American economy. It is becoming obvious that as manufactured goods and products become more and more alike, it is the *quality* of the accompanying service that is the critical difference. Service is the business of business in America today.

The transformation from a marketplace focused on goods to one dominated by services is an industrial evolution that requires a parallel change in the way organizations are structured and—most importantly—managed. Successful service management may be *the* organizational challenge of the decade ahead. Organizations that master the delivery of high-quality, cost-effective service will be the winners. Managers who can manage the development and delivery of service will be the stars.

What does it mean to effectively manage customer service? Is it to manage the moments of truth? A "moment of truth" can be defined as any point at which a customer comes into contact with any aspect of your operation, and *has a chance to form an impression* of the quality of service you provide. There are thousands such moments every day, for every organization.

Effectively managing your organization's moments of truth turns on three factors: understanding and staying close to your customer; articulating the service "package" and service delivery system; and creating genuine employee empowerment. It might be helpful to think about these factors in terms of a *service triangle*. At the top of the triangle is your organization's service strategy; at the bottom right are the people in your organization; at the bottom left are your service systems. In the center of it all is the customer. The value of your service, the quality of your service, is continually being judged by your customers. Consideration of changing customer wants and needs is central to effective service management.

There is a basic point about service which needs to be made. Service is and must be everybody's business: Everybody is in service. Get rid of the notion that service is something which is handled by a

particular department. In those organizations where service is an obsession—places such as Marriott, IBM, McDonald's, and Disney—service isn't a function. It is the product, and customer satisfaction is the measure.

Think for a moment about what we associate with the word *service*—servant, servitude, servile. The connotations are overwhelmingly negative. In fact, in Old Industrial America, no self-respecting business school graduate would be caught dead working in a service business—save banking and finance. Times have changed and our attitudes need to change, too. Rather than placing you in a "one-down" position, delivering quality service places you in the "one-up" position. Managers at Federal Express, ServiceMaster, ARA Services, Wal-Mart, Super-Valu, Southland, and Dayton-Hudson know that service is big business. They also know that it is an intellectual challenge worthy of the most demanding management mind. Those who can accept this fact and get on with it will survive. Those who reject the obvious are in for a rough time.

Customer service is a new strategic tool, a positive force for increasing sales—and for reducing the cost of sales. Lou Gerstner, when he was CEO of American Travel Related Services, called the company's obsession with quality customer service "my most strategic marketing weapon." Economically, it pays to deliver quality service. Just look at the area of customer complaints. An unhappy customer will tell nine to ten people about his or her problem with you. One in eight will tell as many as twenty people! That means the potential loss of much more than that one unhappy customer. The average business only hears from about four percent of its unhappy customers. The sharp service organizations, however, encourage complaints. They know that an unhappy customer who is listened to, whatever the final outcome, is twice as likely to do business with you again as an unhappy customer who doesn't complain or who is ignored. Of customers who complain, seventy percent will do business with you again if the complaint is resolved in their favor. If the complaint is resolved on the spot, that jumps to ninety-five percent.

Acting quickly to resolve customer complaints obviously pays. The complainer who is satisfied will tell five people about the problem he had with you, *and* about the satisfactory resolution. Customer loyalty is, in most cases, worth about ten times the price of any specific purchase! From that perspective, there is no excuse for *not* resolving the complaint in the customer's favor. The customer may not always be right, but he or she is still the customer and the goal of the quality service organization must be to serve the customer.

A customer's positive or negative experience with a complaint, expressed to the company or not, is only one of the many "moments of

truth" which occur in organizations. Customers come to such moments with certain built-in expectations, expectations they have learned from past experience and from the organization's own marketing and advertising. Customers "grade" companies based on whether those expectations are met, unmet, or exceeded. Organizations which simply meet customer expectations are in reality providing only mediocre service. For the service organization to survive and prosper, it must go one step better. It must exceed customer expectations, score above average on the customer's report card. To do this, the organization must first have a thorough understanding of the customer, the center of the service triangle. You must know what the customer expects from the organization's service and how the customer currently perceives the organization's delivery of that service.

SERVICE INCLUDES THE EXPECTATION-SHAPING BUSINESS
HERE AT MASTER-CARE PHYSICIANS WE DON'T GIVE YOU THINGS... WE TAKE THINGS FROM YOU... PARTS OF YOUR BODY.. MONEY.. DISEASE..

The service management concept must grow from the organization's understanding of its customers. It must be a nontrivial statement of intent, of just what it is that the organization will be delivering to its customers. It must be a noticeable difference and have value *in the customer's eyes*. In addition, it must be deliverable. A service concept which is unworkable will only lead to frustration for both customers and employees. To ensure that your organization's service concept is deliverable, it is vitally important that your service delivery systems be both user- and employee-friendly. They must be designed with the organization's service package in mind. In addition, they should encourage feedback from employees and from customers so that they can be self-correcting when they fail to meet customer

expectations. Front-line people are usually well prepared to find ways to improve the systems they use every day.

The final factor in managing quality service is people. Employees must believe and understand that: "To the customer, you are the company." No amount of research into customer wants and needs, no service concept or delivery system, will allow an organization to deliver quality service if the people within the organization are not also working toward this goal. The front-line people need to operate with a consistently high level of concern about, and attention to, the needs of the customer. They are, perhaps, the service organization's most important asset. Yet, judged by the way most organizations treat them, front-line people are the *least* important people in the organization. In most organizations the front-line employee is the lowest paid, least trained, and most poorly screened individual in the organization.

It is remarkably common to find downright toxic people in critically important front-line contact jobs. People who lack the temperament, maturity, social skills, and tolerance for frequent human contact should never be in primary customer positions in the first place. Effective service people are rarely created through smile-training and empty slogans. Instead, organizations must begin to place a premium on attracting and rewarding employees who have a high level of maturity and social skill. Employee commitment revolves about one and only one issue—*trust*. Organizations which trust their employees to work with the customer's needs and expectations always in mind are organizations which empower employees to fulfill those needs and expectations. The organization trusts that the employee will always use his or her best judgment before acting, and the employee trusts that the organization will not punish him or her for taking initiative and making, possibly, an error. In this way customers with special needs and peculiar problems can be seen as opportunities to showcase good service rather than as annoyances that point out the rigidity of the front-line person's job.

It is important to realize that you have a service role in the organization even if you never see a customer. Jan Carlzon, president of Scandinavian Airlines System, points out that if you're not serving the customer, you'd better be serving someone who is.

In any organization, people who have direct contact with the customer are *primary* service people. *Secondary* service contact people serve the customer unseen. Everybody else is *service support*. Most managers are service-support personnel. The manager's responsibility is to help the primary and secondary service employees do their jobs in the best manner possible. As Bill Marriott, CEO of Marriott Corporation, explains, "My job is to motivate them, teach them, help them, and care about them." The purpose of the organization is to provide

support—support for the customer and the people who serve the customer. It has no other meaning or purpose.

When you stop to think about it, management is a service. And like all services, it must change to meet the demands of the marketplace. Just as the service person of today must work to meet customer needs and expectations, the manager of today must work to keep employees motivated and customer-focused. It is the ability of a manager to fulfill this double service role that is at the heart and soul of successful service management. It takes courage, stamina, and dedication to manage well—to be profitable and successful—in Service America.

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In this paper Ron Zemke describes the basics of an effective service-delivery system and succinctly makes his case for why service is important. Readers who want to know more are referred to his books Service America! *(with Karl Albrecht; Homewood, IL: Dow Jones-Irwin, 1985) and* The Service Edge *(with Dick Schaaf; New York: NAL Books, 1990).*

The implementation of a service orientation is, we think, an important innovation within America—one, thankfully, that any traveler in the States today can experience firsthand. But with this innovation comes change, and change, if it is to continue, requires support. The front-line people called upon to implement a customer-is-right policy must be supported by the organization. This should include clear statements of intent and unmistakable acts which show the organization is living by its words. In addition, the front line must be supported with the resources needed to meet high service standards, and people must be able to work "outside the box"—that is, they must be given the freedom to meet the unique needs of customers.

For their part, individuals must learn to tolerate the ambiguity demonstrated in each new "moment of truth" opportunity and to respond with a readiness to defer judgment. We agree with Zemke that it is easier for people to respond in this manner when a high level of trust exists in the organization. ***SSG and DAH.***
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Growing Up Creative in America

Elizabeth B. Larsen

The Broadway musical *How To Succeed In Business Without Really Trying* contains a song—"The Company Way"—in which a young executive questions a company veteran about how to remain in the company. The young executive asks what happens if one has a "genius idea" and the veteran quickly informs him that the "genius" is quickly let go from the company.

It seems that from the time we are children to the time we are adults we ask advice about how to succeed and are often advised "don't rock the boat," "let sleeping dogs lie," or "be a team player." We are very rarely given the sage wisdom to "always question the status quo," "activate the apathetic," or "pursue individuality."

While teaching children to function in society through cooperation we may be snuffing out their natural creativity. It is true that society needs cooperation from its individuals to function and sustain itself, but it also needs strong individuals to predict and define change and to lead societal growth. The challenge then is, "How do we raise strongly creative children to be strongly creative adults?"

As a composer I often talk with people about their experiences with music. Many people tell me that they can't sing. When I ask them about their childhood I learn that someone, often a teacher, told them they couldn't sing. Everyone can sing. It's just that we all sing differently from each other. The mistake which stifles the singer in us is telling someone who doesn't have a cherubic voice and who doesn't easily carry a tune that they "can't sing."

The key is in the definition of "to sing." What does it mean "to sing"? It simply means to raise one's voice beyond speaking. Yet often the definition of the term lies in the domain of the singing leader who has a specific singing sound in mind. Rather than create contexts for many kinds of singing, the leader tells those who don't fit the one context that they can't sing.

Perhaps this is an example of how we stifle creativity in children. Instead of creating contexts for individuality, we force individuals into a single context. Yet if we were to take the other extreme—to create as many contexts as there are individuals—we could never come to a consensus and establish a norm on which to act. Where are the answers?

First, one must understand that creativity and talent are different. Talent has definition and flourishes through discipline and method. Creativity has no definition. It is energy. So a creative child is just that, a creative child who may have talents by which he or she may define creativity.

CLIMB EVERY MOUNTING..
FORGE EVERY STREAMMM
I CAN'T SING EITHER. BUT, AT LEAST I KNOW I CAN'T.
DOO WHAT. SHA BOOM YEE HAW!
BBBBREEP! RIBBIT RIBBIT

In my own case, my creative energy was channeled into two rather rigorous disciplines: learning to play the piano and learning to race sailboats. Both demanded daily practice and were constantly challenging to me. They took a great deal of time in preparation, practice, action, and maintenance. They gave my creativity a context in which to function and grow. Through them I learned to build systems and make them work. I didn't find this kind of context in school. There the norm was too easy and to move beyond the norm meant that I caused problems in the classroom. So I spent my time thinking about music or strategizing races while I intently stared at some reading or math problem I had quickly completed. The key is that I had something to think about. Since creativity is nondirected energy, it needs to be directed and disciplined to be effective. Guiding that direction takes time and effort on the part of parents or teachers, or management. From the point of view of the manager it may be easier to maintain the status quo and dismiss the creative employee than it is to recognize the creative person, listen to ideas, and channel the creativity to productive use.

As I see it, there are four important points to directing creativity from a managerial point of view. First, the company has to want creativity as part of its mission. This means the company must want change and be committed to changing. Second, the company must create a context for creativity. Management must be eager to hear new ideas, eager to try them out and let them grow and change, eager to implement the product. Third, the company must create a context for change. Many creative ideas get stopped in middle management where managers go by the book. The creative context for change means that "the book" is being rewritten to facilitate change. Finally, the company must maintain the creative mind. The company must find a way to balance valuing the creative mind and adapting the creative ideas to purposeful use. If these four points are kept in the foreground—be it family, singing group, school, or company—I believe the creative mind can find its place in society.

Elizabeth Larsen is one of the world's most promising young composers. She lives and works in Minneapolis, Minnesota, where the Minneapolis Symphony has showcased several of her compositions.

The difference between reading Ms. Larsen's brief article and attending her talk at Creativity Week VIII is like the difference between looking at the score of one of her musical works and hearing it performed live by a full orchestra. So I shall attempt to describe a part of what is missing. (I wish I could do justice to her style and impact.)

Her opening remark was "Most classical music was written by old, dead, European men. I am a young, living, American woman."

She went on to point out that being "liberated" or "empowered" by your organization to exercise your creative individuality does not guarantee that you will. You have to be ready to run some risk. It is like learning to ski. You prepare for it, learn the basics, and then the time comes when you stand on the brink of what may look like a monstrous, killer slope. You are committed to push off, but you still have to reach within yourself for that final bit of courage.

There are no medals given for these invisible heroic acts. Perhaps Aaron Copeland's Fanfare for the Common Man *is the only tribute we have to this kind of heroism. The manager who wishes to encourage creative action must try to find ways to acknowledge these quiet acts of heroism when they occur.*

This would help overcome one serious obstacle to the development of a creative idea, product, or way of doing things: audience acceptance. A composer is typically interested in trying something new. But people mostly come to concerts to bathe in the sound of beloved favorites. The composer must find a way to gain acceptance in this situation.

The irony is that, to the first audiences, many now venerable crowd-pleasers sounded horrible and unmusical—like bedsprings being dragged down a staircase. For instance, at the premiere of Stravinsky's Rites of Spring, *the Parisian crowd revolted. Now, we smile nostalgically and tap our feet while listening to it.*

Composers call this the "accessibility" problem. Creative efforts in most domains involve problems similar to it. A really new concept or product can be too far ahead, which guarantees no market acceptance.

When rending your garments and gnashing your teeth over insurmountable problems, try comparing notes with your neighborhood composer, artist, or playwright. In commiserating over your shared frustrations, you may discover that each of you is holding a piece that is missing from the other person's jigsaw puzzle. ***DAH.***

PART THREE

Looking Ahead

Visioning: Building Pictures of the Future

Robert M. Burnside

In many organizations today people feel isolated and overwhelmed by complexity; they have no clear sense of the future and cannot, consequently, see the meaning of what they do. These problems can be addressed by a process called *visioning*, in which a picture of the future is created. Although visioning techniques vary, they all have one thing in common—they are fundamentally nonverbal, relying on visual images as a basic element. Because it allows one to think in a way that avoids the constraints associated with language in an organizational context (its tendency to be mechanical, analytical, and thus emotionless), the process can be liberating and creative and may thereby address additional problems in the organization. In this paper I will describe how the Center for Creative Leadership assisted two very different clients in their visioning. But first, I should say a few words about what a vision is.

What is a Vision?

A vision can be described as a living picture of a future, desirable state. It is living because it exists in the thoughts and actions of people, not just in a written document. It is a picture because it is composed not of abstractions but of images. As Bernard Lievegoed noted in his 1985 book *Man on the Threshold* (Stroud, England: Hawthorn Press, p. 75), "Images are more meaningful than abstract definitions. Images always have a thought content, an emotional value, and a moral symbolic value." A vision is thus integrative because it brings these dimensions together.

The focus of a vision is on a desirable future, where circumstances are different and better than current ones. It does not, however, concentrate on how to achieve that future.

A vision orients, and thus steadies, a person. It can be used to organize materials and thereby control complexity. By establishing future goals, it can give meaning to current thoughts and actions. When it is shared by people within an organization it helps define relationships and overcome alienation. The more it is held as a com-

mon picture, the more powerful it can be in helping overcome the inertia of the present state.

A Tale of Two Clients

There are a variety of ways to accomplish visioning. Techniques range from structured to very loose and free. With our clients we have used both a highly structured and a free-flowing technique. (The following accounts use fictionalized names in order to protect confidentiality.)

Chemical, Incorporated

Chemical, Inc., is a $2 billion division of an oil company. The Vice President of the R&D Department approached us recently to do an Innovation Assessment Process to determine what was stimulating and obstructing employee creativity in the organizational climate. The company had recently completed a downsizing process that eliminated two-thirds of the workforce. Despite the fact that growth was beginning again, and the R&D budget was increasing, employee morale remained very low.

In the assessment process all employees received a questionnaire to complete, and thirty-five employees were personally interviewed for one-half hour about the stimulants and obstacles to creativity in their organization. During these interviews, employees were cynical, mistrustful of management, and discouraged about the future.

The results of the questionnaire confirmed that employees mistrusted management, management's style was overly directive, and the atmosphere was highly political. The management team of ten people came to the Center for a three-day meeting to review the results. We started the first day with a visioning process, reasoning that, as David Campbell says, "If you don't know where you're going, you'll end up somewhere else!"

The technique we used with the team to stimulate their imaginations was relatively analytical and structured: They were told to imagine that the 1992 version of their industry's trade magazine *Chemical Week* had just come out with a lead article describing the incredible success of the Chemical, Inc., R&D Department, how it had become the model of the industry, and describing the process they had used to change it. Each manager, working alone for an hour, was told to draft a version of that article. Then, each prepared a flip-chart presentation of their article, which he presented to the group. When

all had presented, common themes were noted. From these, the group drafted a vision statement, which read:

> Technology is crucial to the success of Chemical, Inc. Research and Development will provide a continuous stream of innovative technologies to drive the company's growth. Freedom and respect for each employee are essential for innovation and growth.

This vision statement was tremendously exciting for this group of managers. The next day they received the feedback from the assessment process. There were no surprises here—just confirmation in objective data of the hallway talk. They put the findings of the CCL survey into their own words and themes. On the third day, we reviewed with them possible feedback strategies with the rest of their organization, emphasizing face-to-face meetings with the employees to review the survey results and the new vision statement.

The open discussion of their many problems, and the codification of a new vision of how they would operate, was exhilarating to the management team. Much to our surprise, they called together the employees immediately on their return to the organization and shared the overall results and the new vision. Then they quickly organized and pulled off two-and-a-half-hour meetings with all employees in groups of thirty. At the conclusion of each session employees spontaneously volunteered for "vision action teams" to handle the problems identified. It was just as if a flash fire had ignited and spread through the organization. Of course, similar to flash fires, there was the danger of a quick surface interest and then back to the same old ways.

Despite the confusion of the quickly formed teams, however, many of whom were inadequately trained, the management team's commitment to change allowed the change process to take root and hold. Management took three actions that helped sustain the change process.

First, the employees had suggested two changes to the vision statement, both of which were accepted by management. They added the words *and people* to the statement: "Technology and people are crucial to the success of Chemical, Inc." And they added the word *teamwork* to the statement: "Freedom, respect, and teamwork are essential for innovation and growth."

Second, management allowed the structure of the executive committee to be changed to allow more participation by employees, and named the new group the "Vision Steering Committee."

Finally, management allocated funds to support the actions of the vision action teams, and scheduled group meetings at six-month intervals with all managers to assess the efficacy of the change effort.

The latest of these review meetings was held in November 1989. All eighty managers were invited to the day-and-a-half meeting, which was divided into three parts: Look how far we've come; where we are now; and continuing to build the vision. The format for the first section reviewed results of a recent survey that measured how much progress employees felt had been made in the past two years. These results were very positive. Then, managers were put into eight mixed groups with the assignment to discuss how the organizational climate today compared with the climate two years ago. They were told to prepare a picture or display that captured how it was two years ago, and how it is today. Finally, they had to prepare a "celebration sound" other than clapping to conclude their presentations. What a difference in how these managers acted compared to their behavior in the interviews two years before! They were enthusiastic, exuberant, creative and uninhibited in their presentations. One group prepared an "idea machine," meant to represent the ideas developed within R&D. In the before picture, the group of ten people milled around aimlessly, bored and sad, stuffing ideas into the "idea machine," with no results. In the after picture, the ten people joined together, smiling, coordinating their efforts around stuffing ideas into the machine, and results came out! Another group compared the before and after to the opening of the Berlin wall. It is the same as the opening in Eastern Europe, they said. The only difference is a matter of degree. For their celebration sound they mimicked the Czechoslovakians by jingling their keys. One of them, a Czech, said, "The vision is the key that unlocks us from the prison of conformity." Three of the groups designed models that incorporated sunlight-receiving cells. These cells "brought in the light of the vision to guide and power our efforts." All of the models described the present as much improved over the past, though all were careful to note that there still was much left to be done.

The exuberant behaviors of these managers compared to two years ago was strong testimony to the power of the visioning process, even with the rather structured and rational approach used to kick it off at the start. The enthusiasm experienced by the management team in the beginning had been successfully extended into the ranks.

Advertising Agency, Incorporated

This was a very different organization—a private family business, consisting of a total of one hundred employees, doing advertising business in the northeast United States. The five-member management team wanted to look at improving its leadership style and the creativity of the organization, as leadership was in the process of

being passed from the father to the son. The management team spent two days at the Center, during which time they identified the need to develop their own vision of the future of the agency. They felt strongly that to grow, they had to move away from being a local advertising-only firm, to a national comprehensive communications firm. They developed the vision on their own, which they presented to employees two months later. This was the second of a series of one-day-per-month interventions by the Center at the client's site.

Management gathered all one hundred employees at an off-site training center to present their vision of the future. The lights went down, and a slick multimedia presentation began, using slides of employees, music, buzz words from the new vision, and a voice-over describing employees in the future company as "new age communicators."

At the end of the ten-minute show, the new head, the owner's son, stood up and delivered a speech that summarized what the management team hoped for in the future company. Then each of the other management team members stood up and delivered a brief view from their functional area. Finally, in an emotional speech, the father "passed the mantle" to the employees. The employee group was young, most in their late twenties and early thirties and expressed a lot of enthusiasm. After the presentation, the hourly employees went back to work, and the forty exempt employees stayed for the remainder of the training day, which was to be led by Center staff.

I felt it was important to let them imagine from their point of view what the future might look like. Management had given them a clear logical description of what the agency must become to survive the marketplace changes. But these would remain just words unless they developed them into living pictures through exercising their imagination—i.e., doing visioning. I explained to the group that visioning the future means going there now—a suspension of time and space that imagines the future state as successfully attained. We would "wake up" in this attained state, and using all our senses, would note what we saw, heard, felt, etc. This would be a nonrational, nonanalytical approach to attaining the future. We were not worried about how to get there but rather what *there* looked like. Many times people confuse visioning with how to get there, without ever really examining what the there looks like that they are trying to achieve.

Because this was a younger group than at Chemical, Inc., and in a profession more open to free use of the imagination, I decided to use a visioning technique that was more free-wheeling than the one used with the other group. This technique is called *guided imagery*. I had the forty people close their eyes and get relaxed as I played some soft new-age-type music in the background. After a couple of minutes, I

told them to wake up in the future (in 1994, which was the target year given by management that morning). "You have successfully attained that which you were seeking as a firm. You are in your work place. What do you see around you? What sounds do you hear? What are you doing? How are you feeling?" After each question, a pause of a minute or so was allowed. "Now, walk away from your work area and join a meeting of your colleagues. What do you see occurring? How are you interacting? What do you see, hear, and feel? How has this changed from before? Now, walk around the building. What does the architecture look like? Notice an interaction between management and an employee. What occurs? Finally, attend a client briefing session. What is happening? Who is there? What is the client saying? How is it different than before?"

All together, they spent about eight to ten minutes with their eyes closed in this guided imagery tour of the future. Then I turned down the music, asked them to return to the present, and gave them fifteen minutes of alone time to "make notes, pictures, that capture for you the significant images and events you saw occurring." Next I put them into six groups of about seven people each. They had one hour to share their pictures of the future with each other. They were required to report out what was in common in their pictures and what was unique.

The groups worked hard with a lot of energy and laughter. At the report-outs, I was surprised how much there was in common in each of the six groups' summaries. Every group had a similar picture of the architecture of the building: "a gutted warehouse, with lots of windows that let in huge amounts of light . . . flexible office walls with walls for the introverts, and open areas for the extroverts . . . sunken living rooms for the cross-functional client-focused teams. . . ." There was much more in the employees' vision about relationships and how people would treat one another than in management's vision earlier that morning. In fact, after every group had in some way described how "management would stop treating employees like children and speak honestly about what they were going to do," I began to get nervous. What exactly had I unleashed here with this visioning process? Management had given a clear, if dry, presentation that morning, and here this afternoon I had forty employees clearly set on, among other things, reforming how management interacted with them. How would I resolve this without causing a disturbance within the organization? After the summaries, I put them into six groups by department to work on identifying the top issues that needed work. During this time I reflected on the employee groups' report-outs. Their vision of the future had more emphasis on the relational aspects of the workplace, whereas management focused more on the strategic exte-

OH MY, I SEE A FACTORY WITHOUT WALLS HIGH ON A BEAUTIFUL GREEN HILL.. ..NO NOISE BUT THE SONG OF BIRDS.. ..FRESH, CLEAN AIR.. PEACEFUL... SAY! WHAT IS HOLDING THE ROOF UP?? HOW DO THEY DO THAT???
D.O.S.

rior aspects of the firm. Although the employees' vision was somewhat different in emphasis, it fit in well with the strategic objectives management had set. They had not challenged these; in fact, they underlined and supported them. Therefore, I decided to use the analogy of a conversation between management and employees, noting that management set the picture strategically, focusing on the external relations of the organization, and the employees focused on the internal relations. I called the strategic picture the "head" side and the relational picture the "heart" side of the organization. Management had worked on the head issues, while employees had worked on the heart issues. Together, the two visions made a whole.

The employee group wanted to produce a slick version of their common vision to present to management and the rest of the organization. They elected one representative from each of the working groups to make a "Gang of Seven" who would produce the employees' response vision during the next month.

A month later the employee group's vision was presented to the combined organization. It was received with great enthusiasm by management: "An excellent and exciting picture of the future that fits with what we had envisioned." I was very moved by the presentation—it included music and slides and featured an audiotape of a new

employee's first day joining the firm and what she experienced. The employees were excited and proud of what they had attained. As the facilitator, I was pleased that the two visions went hand-in-hand, complementing each other and building a greater whole.

Conclusion

Essentially, both at Advertising, Inc., and at Chemical, Inc., the visioning process had released great quantities of creative energy from the employees, with the only stimulus being that they free their imaginations from the use of only words and the focus on the present, allowing themselves to dream in complete images of the particular future state that they wished to attain. The future states that emerged were characterized by having both strategic hard aspects of bottom-line delivery, and the soft side of relationships and values. Even better, they had particular detailed descriptions of what the future would look like, toward which they could strive.

Almost all firms today express a need to have a clearer picture of the future, to understand and answer why they do the work they do. The release of the individual human imagination through visioning techniques is a powerful way to begin forming a clear picture of what they want to achieve. Not only does a clear picture emerge but a great release of energy and creativity comes with it.

Acknowledgement

I would like to thank Marjorie Parker of the Norwegian Center for Leadership Development in Oslo, Norway. Various conversations I had with her in 1989 regarding her visioning work with Norwegian organizations were helpful in developing the thoughts in this paper. See her 1990 book *Creating Shared Vision: The Story of a Pioneering Approach to Organizational Revitalization* (published by Dialog International Ltd., P.O. Box 115B, Clarendon Hills, IL 60514).

Note

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LeaderLab® is an advanced training program for people who have already learned or discovered for themselves the elements of survival and success as a manager. An important and highly appreciated part of LeaderLab® is helping these experienced leaders learn how to shape the vision for their organization.

Bob's understanding of the problems that managers face was gained firsthand. It began with his fresh-from-college experience in management in a small village in India. Subsequently, Bob spent more than fifteen years with Wrangler Jeans, eventually rising to the position of vice president for merchandising. ***SSG.***

The Era of Multiple Transformations: Megatrends for Adults

Michael Marien

You have heard it before: "We live in a complex and rapidly changing world that is filled with dangers and opportunities—and a multitude of challenges demanding innovation and creative leadership."

Yet it is a basic truth of our times. It is the global context that *demands* change in the way you work and live. Either you will get swept along in what Robert Theobald has called "the rapids of change," or you can make some attempt to understand the change in some greater detail and to structure your organization for necessary innovation.

I must stress that this attempt will always be imperfect. We cannot *know* what will happen in the future, and it is difficult to even know what is happening right now. Still, we can make an effort to get some sense of what is happening and what might happen; an imperfect effort is better than no effort at all. We can't know exactly where we are headed, but if we want some control on where we end up—as individuals, organizations, and societies—we would be wise to put some handles on our whizzing world.

What I seek to provide here is a simple but systematic way to sketch the "multitude of challenges" that we face.

"TS3": Transformations Scanning, Selection, and Synthesis

The label we use for our times and our society is important. Many profound changes are taking place simultaneously, so it is imperative to view the global context as "The Era of Multiple Transformations." This may seem to be obvious yet we do not focus on a broad array of changes in the "organizational environment." Instead, we focus on a single change: a mass society, a computerized society, a service society, a high-tech society, a globalizing economy, or a polluted society. All of these specific labels suggest truths. But no single label is close to adequate in describing the global context, and none is key to all the others.

To get useful handles on our era of multiple transformations, I propose the "TS3 Method," standing for "Transformations Scanning, Selection, and Synthesis." Three simple rules apply:

Scan Three Broad Categories: Technologies, Events, and Ideas

We can readily imagine the major forces that shape our individual lives. Technologies such as automobiles, television, computers, drugs, and air conditioners influence our lives for better and, if misused, for worse. Events are a major force in our lives: births, deaths, divorce, getting and losing a job, parenthood, a serious accident or disease, winning the lottery. Ideas are also influential: who we are, what we can be, what work we can and should do, where we live and work.

Similarly, we can use the same three broad categories in thinking about society and the global context of our organizations. Under each category, we can then list the three or four most important ongoing or potential changes. Under the heading of technology, the major clusters that are shaping society are information technologies, biotechnologies, energy technologies, and weapons technologies. (All will be subsequently discussed in somewhat finer detail.) The major events that could alter the course of society include war and nuclear-weapons detonation, economic collapse, population growth (the cumulation of billions of "blessed little events"), and environmental changes resulting from large and small acts of pollution. Ideas that shape society include images and concepts enjoying political power (conservative ideas, progressive ideas) and grass-roots ideas that somehow gain widespread force (such as feminism, entrepreneurialism, the death penalty as an element of justice).

These three broad categories overlap, much like the wonderful old logo for Ballantine Beer, with its three rings for purity, body, and flavor. Technology can produce events and ideas; events can stimulate technologies and ideas; and ideas can result in technologies and events.

Consider Both Hopes and Fears

The "TS3 Method" involves megatrends for adults: an honest assessment of the most important aspects of what is happening, what is likely, and what is possible. As is true for any serious intelligence-

gathering effort, one must avoid the distortions of both Pollyannas and Cassandras (Laqueur, 1985). It is especially difficult to avoid the childlike extreme of Pollyanna (Matlin & Stang, 1979), because of the widespread tendency to select the positive and to favor people who are upbeat and optimistic. Children evade problems and fantasize with a naive optimism or a debilitating pessimism.

Adults are more likely to face their problems with a "tough-minded optimism" (Gardner, 1963). Our society has a broad array of major problems; collective evasion will only allow many of them to become worse.

Change the List Over Time and to Fit Local Circumstances

Today's big concern may quickly become small or disappear (urban riots in the 1960s; oil shocks and perceived resource limits in the 1970s). Other major transformations may be applicable only to a city, a region, or an organization (notably natural disasters such as hurricanes and earthquakes, or technological disasters such as Bhopal and Chernobyl).

A case in point is the AIDS epidemic. The disease was identified only a decade ago. It has been seen as a potentially transformative event only in the last few years, and is already stressing the health-care system in a few major cities. If a vaccine or cure is not found in the next few years (presently considered by experts as unlikely), AIDS could well be one of the major societal problems of our time, with profound impacts on the economy, the health-care system, the family, and sexual behavior. If a vaccine or cure is found, AIDS could just as suddenly be removed from the list of transformations.

But let us put AIDS aside and look at some of the major transformative forces and possibilities, using the three basic categories to help in the scanning, selection, and synthesis.

Technologies

There is no question that we live not only in a highly technological society but in one for which many new tools are being developed, for better or worse. Thinking about technology is generally exciting and upbeat, but there is a downside to each of the technological clusters briefly discussed here.

The Telematic Transformation

It's also known as the information society, the silicon society, the microchip revolution, or the computerized society. The computer, and its ability to store and manipulate information, is the central technology. Robots, talkwriters, and artificial intelligence represent advanced applications of computers.

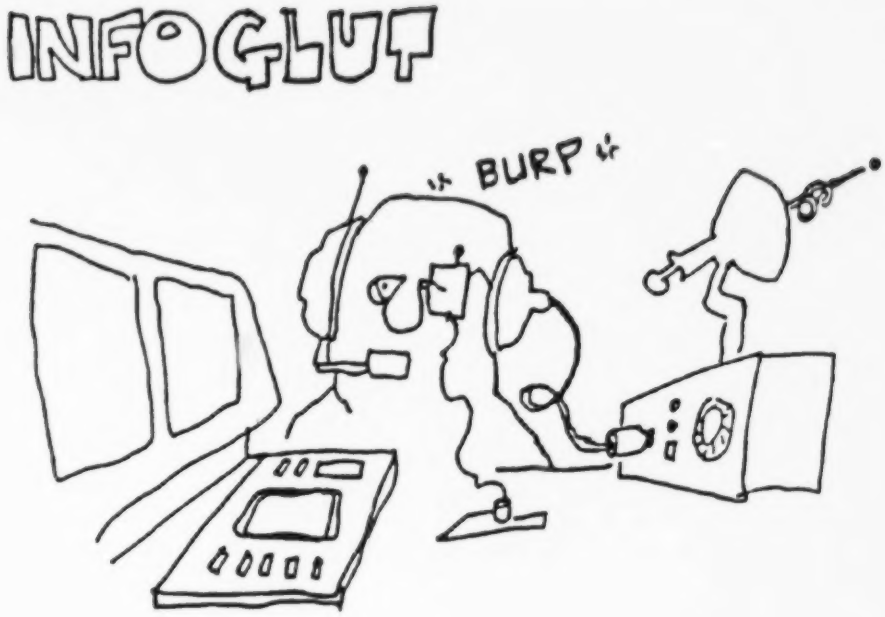
Another stream of technology involves telecommunications: television, cable, satellites, mobile phones, and VCRs. The two streams of information technologies are merging, as already realized in videotex and, perhaps in a decade or so, to be realized in automatic language translators. In this sense, the French word *telematique*, anglicized as *telematics*, is particularly apt to describe the range of information-related technologies.

Still another stream is based on optics technology, involving a host of technologies based on lasers and glass fibers. Resulting products include fiber-optic cable, which will greatly enhance telecommunications capability, and compact discs, which greatly enhance data storage.

The impacts of this growing flood of new information-related technologies are numerous, and only beginning to be recognized. In 1986, I counted one hundred impacts of the new information technologies; today this inventory is surely higher.

What does it all mean? Clearly there are many benefits, as advertisers of consumer and office products ceaselessly point out. We have the ability to store and manipulate vast quantities of information, we have new and quicker access to these vast quantities, more and better linkages to people, enhanced thinking capability through "expert systems," etc.

But there are three broad negative areas that should also be kept in mind: (1) *Infoglut:* A growing flood of information does not necessarily result in wisdom and may in many instances inhibit it. Moreover, the ready availability of video entertainment may be at the expense of civic edification about the problems of a complex and changing world: We may be amusing ourselves to death (Postman, 1985). (2) *Misuse of Computers:* The haul from computer crime is perhaps ten times as great as old-fashioned face-to-face bank heists. There are also legal uses of the new technology that have pernicious effects: paper entrepreneurialism of corporations, and the growth of interlocked data banks in government. (3) *Unemployment:* Most serious observers foresee more jobs lost than jobs created, at least in the short run, as a result of automation on farms, factories, and offices. Moreover, although some jobs are made exciting by computers, many other tasks



are being "deskilled," which could lead to a bifurcated labor force of "Gods and Clods."

Biotechnology Revolutions

Fast on the heels of the telematic revolution is a broad cluster of developments in biotechnology.

At a time when the extinction of naturally occurring plant and animal species is accelerating, the capability to create new species or modify existing species is also growing. Relatively little benefit has yet to be realized, but scientists and biobusinesses are excited by the many possibilities to transform agriculture (Doyle, 1985) through genetic/engineering. The downside of this prospect is the possibility of unleashing some new Frankenstein monster.

New drugs are constantly being developed, and new capabilities for scanning and modifying human genes can have an impact on many ailments. Perhaps the greatest biotransformation of all is the possibility for life extension. If the aging process is retarded, stopped, or possibly even reversed, many more people will be in the labor force at a time when jobs are made scarce by automation. And if more people retire and postpone their ultimate demise, think of the further prob-

lems we will have with Social Security! Our collective problems seem likely to be aggravated, but as individuals, would any of us prefer not to live a longer and more active life?

The On-Off Energy Revolution

Energy was a major focus in the 1970s, when oil was scarce. Oil is now seemingly abundant and the price has dropped beyond anyone's expectations (a prime illustration of the hazards of forecasting). Some experts argue that we are using oil more efficiently and that there is much more that might yet be discovered. But others warn that oil supplies are limited and that we will begin to run out in the next few decades, and that, as recent events dramatize, we are still vulnerable to a disruption of supply from the Middle East.

Developments in one or more of a score of potential technologies could result in energy that is cheap, abundant, reliable, and safe. There is promise in nuclear fusion, photovoltaics for capturing solar energy, superbatteries, hot dry-rock geothermal energy, new scrubber technologies to reduce the pollutants from burning coal, etc. A new mix of energy technologies may or may not have a transformative effect on our lives. The transition to this new mix may or may not be smooth. Despite the many exciting prospects, we aren't out of the energy woods yet!

Other Technologies

Three other clusters of technologies deserve brief mention. A transformation is underway in the generally unspectacular but nevertheless important realm of materials. Plastics and ceramics are finding a wide variety of uses, in automobiles for example. A new process for coating objects with a film of synthetic diamond will enhance the durability of many objects. A new and much stronger cement is being developed, resulting in sturdier buildings.

A second cluster of technologies involves the tools for exploring and exploiting outer space.

A third cluster, somewhat overlapping with the second cluster, involves military technologies. There have been many advances in conventional weapons, as well as devices for delivering nuclear weapons. The Strategic Defense Initiative, or Star Wars, promises a whole new era of space-related military technologies which may or may not enhance national security. Nuclear weapons also may or may not enhance our security. There are today some 50,000 of these weapons

in the world, with a total explosive yield 1.6 million times that of the Hiroshima bomb. A single twenty-megaton bomb would have a yield 1,600 times that of the Hiroshima bomb. The detonation of such a bomb would surely be a transformation, not only for the locality unfortunate enough to experience its force but quite possibly for the course of human affairs. How likely is this major event?

Events

In thinking about the future, we generally do not think about unscheduled events because they are unlikely and difficult to predict. Also, most events are negative. Yet we know from our personal lives that major events can be transformational, and we take precautions to avoid fire in our homes and automobile accidents when we travel. We purchase insurance to ease the impact of these improbable events. But they do happen, both for individuals and societies. In thinking broadly about an era of multiple transformations, then, we must think about the possible events, both large and small, that can have a major influence on society.

An Irradiated Society?

For the past forty-five years, we have entertained visions of nuclear holocaust. In the past few years, the ultimately negative vision of immediate destruction from all-out nuclear war has been supplemented by a vision of longer term ecological disaster from a nuclear winter. Certainly, this is a transformation to be avoided at all costs.

What is the likelihood of such a transformation in the next decade or so? It is small but possibly growing. One indicator is the "Doomsday Clock" expressing the sentiments of the editors of the *Bulletin of the Atomic Scientists.* In December 1991 the clock stood at seventeen minutes to midnight.

It is somewhat more likely that we might experience a limited nuclear war, perhaps between Third World countries. Such an event would fall short of the image of nuclear holocaust, but it would involve much death and suffering.

It is far more likely—although still not probable—that a nuclear weapon will be exploded in the next decade or so as a result of a terrorist incident or an accident. The detonation of even a single bomb would result in far more damage and suffering than the Chernobyl accident.

A Collapsed Global Economy

The second major transformative event to fear is a major economic collapse. Clearly, a new globalized economy is in formation, encouraged by revolutions in communications and transportation. But this world economy is in precarious shape, with many nations deeply in debt and threatening default. Even in the United States, seemingly on an elusive path to economic "recovery," the federal government faces a record deficit, there is a record trade deficit, and corporate and individual debt are also at record levels. What happens if these relatively good times come to an end?

In contrast to a nuclear weapons detonation, where thinking about it can help in prevention, thinking about a possible economic collapse could weaken our faith in the system and become a self-fulfilling prophecy. And so we content ourselves that "It can't happen here"—the same sort of complacency that held, until recently, that space shuttles could get off the launch pad safely and that large chemical plants as in Bhopal were safe.

I am not contending that a Second Great Depression will happen but only that the possibility of such a calamitous event in the next decade or so is large enough that we must keep it in mind.

A Crowded Society

And now a shift from relatively discrete and sudden events to the global cumulation of small and often happy events of human birth. A good way to keep the basic figures in mind is to use this simple ditty: "Two, Four, Six, Eight: Think of How We Populate!"

Think about global population growth in the most general terms. In 1930 there were two billion people. In 1975 there were four billion. Shortly before the year 2000, there will be six billion, and this number will grow to eight billion by 2025—well within the lifetime of many of us. In 1986 we passed the midpoint of this growth from two billion to eight billion, with the announcement of more than five billion people.

Most of the expected growth—some ninety percent of it—will take place in the already overcrowded Third World. Indeed, in some parts of Africa, human population has outstripped the carrying capacity of the environment (Brown, Wolf, & Starke, 1986). We have added three billion people to the planet in the past sixty years, and are likely to add another three billion in the next thirty-five years. Where will we put them? Should we build structures up into the sky? Down into the earth? Out in the oceans? Will the flood of illegal immigrants from

the poor countries to our relatively affluent country—estimated at a million a year in recent years—continue to increase at a rapid rate?

A Polluted Society

Each act of pollution is an event, and these events add up. Some forms of pollution (e.g., auto emissions) have been reduced in the last decade or so. But others have increased: for example, the various pollutants resulting in acid rain. This has led to the dying of some American forests, especially in the East. The forests of Europe are dying at an alarming rate. (Tropical forests are disappearing too, but for economic reasons.) Only in the past few years have we discovered the pernicious and expensive problem of toxic waste, which must be controlled and cleaned up. Release of chlorofluorocarbons has damaged the global ozone layer and is expected to result in an increase in cancer. The ultimate environmental catastrophe is the "greenhouse effect": the warming of the global atmosphere due to human activity, resulting in climate change and melting of the polar icecaps, in turn flooding major low-lying cities.

We cannot continue to pollute the earth, and environmental consciousness must become part of our thinking (and our economics) sooner or later. This will involve a necessary transformation in our assessments of what can and cannot be done, and at what cost.

Other Events

What else could happen? Natural disasters (floods, hurricanes, earthquakes, volcanic eruptions) can transform a small country or a region of a large country. The United States is too large and diverse to suffer irreversibly from any one natural disaster, although a major earthquake of 8.0 Richter scale magnitude or more could strike either the West Coast or the Midwest in the next few decades.

The discovery of beings from outer space, although very unlikely, could have a very high impact (or it could merely be an ephemeral sensation). Presidential assassinations or sudden death in office can also change the course of a nation's history, but this is unlikely, and the successor regime frequently carries out the predecessor's policies. (This rumination leads to considering the impact of political regimes, below.)

Ideas

A recent article reminded us that "Ideas Move Nations" (Easterbrook, 1986). Consideration of how this is so is a vast topic that can only be touched on briefly here by sketching three idea clusters (or ideologies or worldviews) that could transform society.

A Conservative Society?

The advent of the Reagan regime in the 1980s (unanticipated by any futurist that I know of) signaled the beginnings of a more "conservative" era to many, especially to those who favored it. Ideas empowered by the Reagan Administration included a "strong defense" (military buildup), free markets (deregulation of transportation, communication, and finance), and privatization of government functions where possible. The notion of the Strategic Defense Initiative, nurtured at the conservative Heritage Foundation, is an exemplary instance of how ideas shape our destiny.

How long will the "conservative era" last? Partisans argue that it will last for decades and that liberalism is discredited. Opponents assert that it is a historical anomaly. Much depends on the fortunes of the economy, and at this moment the fate of that seems profoundly ambiguous.

A Neo-progressive and Sustainable Society?

The alternative regime under the Democratic Party would pursue policies that are socially "progressive" to some degree (favoring more equality, higher employment levels, less defense spending) and environmentally "sustainable" (more controls on pollution and more expenditure on cleanup). How likely is such a regime in 1992? Politics is the area of human affairs perhaps least amenable to any prediction, and even informed nonpartisan speculation can often prove wide of the mark. All things considered at this time, though, it would seem that there is a small chance of a different regime—and hence different ideas in power—following the 1992 Presidential election.

A Feminized Society?

Some ideas are best realized by political power; others well up from the grass roots and may or may not benefit by laws and govern-

ment programs. An example is the changing role of women in society, with ever greater numbers of women participating in the paid labor force instead of doing unpaid household and community work. Some argue that the growing presence of women in management and the professions has led to a greater feminization of our public and private lives (Lenz & Myerhoff, 1985). Others argue that this is still far from being realized, or that "women's values" are not substantially different from those of men.

Other Ideas

Other political ideas (libertarianism, socialism, anarchism) are not especially widespread at this time, although their fortunes could change over the course of a decade or so. Other ideas about society wax and wane. One idea deserving comment is that of "entrepreneurialism" (or, within organizations, "intrapreneurialism"), which seems to be one of the legacies of the 1980s, for better or worse. It is probably associated with the Reagan regime, and will last for about as long as the conservative movement lasts. The ideas of "cooperation," "consolidation," and "control" could become fashionable and dim the lustre of the unfettered entrepreneur. Or "entrepreneur" may simply be a synonym for the innovation that is necessitated and enabled by our times.

Systems Increasingly in Crisis

To synthesize these transformations, and to summarize, there are many big changes that are taking place and that could take place. Some complement each other and some are in conflict with each other. But clearly, for better or worse, we are in the midst of an era of multiple transformations.

Our capability for understanding any of these single transformations is generally not very good. Our capacity to look at these transformations all together is nil.

As a result, more than ever, we are an "unprepared society" (Michael, 1968). We are undergoing several major technological revolutions, and we are subject to a variety of major "mega-events" that are likely to change our policies and our lifestyles. A profusion of ideas about where we are and what we should do will continue to influence our lives, to cancel out the effect of earlier ideas, or (justly or unjustly) to be ignored.

The pace of change is accelerating, and individuals and organizations are caught in this maelstrom. And thus, like it or not, we must innovate to survive.

As an individual, what can you do in general?

Acknowledge uncertainty. The "Multiple Transformations" concept makes it easy to do so, and opens the doors to necessary learning.

Keep on learning. Slogans about lifelong learning and self-renewal are more important than ever. Your image of self and society will necessarily change as society inexorably changes. As noted by Harlan Cleveland (1985), leaders in an information society must reeducate themselves for this new environment.

Keep inventing your future. Collective choices for your community and your organization will have a major impact on your future; as a leader and a citizen, you should try to influence them. These choices are generally not a single choice between two one-way paths but the ongoing invention of futures in an uncertain world.

Smile, if you can. We live in exciting and interesting times, but they are not necessarily happy times for many. Many systems in both the public sector and the private sector are in crisis or will be in crisis. Most of us will be unable to avoid some pain of transition, but much of this thinking could be lessened by better thinking in high places. An appreciation of our era of multiple transformations could stimulate this improved thinking.

The only certainty is that your organizational environment will be uncertain—increasingly so, I suspect. So acknowledge the uncertainty, keep on learning, keep flexible and innovative, and smile if you can. With luck, and a lot of creative leadership in the public interest, we may all muddle through to the twenty-first century.

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At the same Creativity Week (number IX in 1986) that Michael Marien presented this paper, Alan Bean, astronaut and artist, spoke of his contacts with Soviet cosmonauts. He was asked if the Soviet Union would ever discard its affection for Darth Vader and The Dark Side. Bean replied that the Soviets were still reverberating from World War II and that substantive change could not occur until the leaders no longer remembered, personally, the 1940s. He said he doubted that a change would occur in fewer than twenty years.

There we see the hazards of predicting the future. Michael Marien points out that the timing of events, even events driven heavily by ideas, is essentially unpredictable. It's no trick to predict that the fault at New Madras, Missouri, will give us another major earthquake. The difficult issue is when.

For those of us who have been astonished by the events of the recent past, Marien's prescription for responding to our age of "Multiple Transformations" makes real sense. The beginning of a new century has traditionally been a good excuse for inventing a new future. If you begin to feel plagued by a plethora of millenniumists, Michael Marien is still at the World Future Society in 1992, ready to offer you tough-minded assistance. ***SSG and DAH.***
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Readings in

INNOVATION

Each year from 1978 through 1987 the Center for Creative Leadership hosted an event called Creativity Week, during which a select group of researchers and practitioners would get together for a high-energy exchange of ideas on organizational creativity. Discussions explored such themes as individual innovation, creativity and teamwork, structuring the organization for innovation, and the relation of innovation to culture and technology. This book, which offers papers based on many of the best Creativity Week presentations, is thus a record of recent thinking, both practical and theoretical, on how organizational effectiveness can be improved.

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